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PREFACE.

The success which has attended the Author's first series of "Questions and Answers on Useful and Interesting Subjects," has induced her to attempt another, not quite so childish and simple in its style, and entering more fully into the subjects touched upon.

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CHAPTER I.

CHRONOLOGY.

Q. From what is the word Chronology derived?

A. From two Greek words, *Chronos*, Time, and *logos*, a discourse?

Q. How has time been divided?

A. Into eras, or epochs, or certain periods at which great events have happened, and from which time is reckoned.

Q. What are the greatest of these eras?

A. The creation of the world, from which the Jews reckon, called the Jewish era; and the birth of Christ, from which the Christians reckon, called the Christian era.

Q. What were the principal eras among other nations?

A. The Romans reckoned from the building of their city, and the Greeks by Olympiads.

Q. Are not certain letters used to represent these eras?

A. Yes; A. M. anno mundi, or year of the world, for the Jewish era. It is 5854 years since the creation of the world; we are therefore in the year A.M. 5854.

Q. What letters are used for the Christian era?

A. A. D. anno Domini, the year of our Lord; it is 1851 years since Christ was born; we are now, therefore, in the year A.D. 1851.

Q. What letters were used by the Romans?

A. U. C. urbis condita, the building of the city. The present year would be U.C. 2603, as Rome was built 753 years before Christ.

Q. What was an Olympiad among the Greeks?

A. A space of five years; during the fifth the Olympic Games were celebrated.

Q. What were the Olympic Games?

A. Feasts in honour of Jupiter. The rst Olympiad commences 776 years beore Christ was born; this event hapened in the 155th Olympiad.

Q. Have not the Mahometans a partiular era?

A. Yes; they reckon from the Hegira, r flight of Mahomet, which happened 22 years after Christ. The Mahometans elieve that Christ was a prophet, but hat Mahomet was greater than he.

Q. Have other nations particular eras, rom which they date their time?

A. None of importance; as most civilzed nations date from one of these, exept the Chinese, who date from the eluge, and say that they are the real decendants of Noah, and that their first ing, Foi, was Noah.

Q. What people first divided time into ears?

A. The Egyptians; at first a year conisted of only one month, then four, and t last of a lunar year, consisting of 360 ays.

Q. What advantage do we gain by knowing this?

A. It explains the cause of the great age of the world as stated by the Egyptians; and also proves how easily some of their kings could have lived a thousand years, as stated by them.

Q. What other nation at this time adopted the Egyptian year?

A. The Greeks; Cecrops, the Egyptian, founded Athens about the time of Abraham.

Q. What is supposed to have first occasioned the division of time into years?

A. The changes of the moon; as it passes round the earth in twenty-nine days and a half; this time, now called a month, formed the first Egyptian year.

Q. What occasioned the next change to twelve months?

A. The discovery that the different seasons returned again in the space of about 360 days; but, although the Chaldeans were the earliest astronomers, and Egypt has been called the cradle of the sciences, it was many years before they discovered the real cause of the changes of the seasons.

Q. By whom was the length of the solar year fixed?

A. By Thales, a Grecian philosopher, and one of the seven wise men of Greece; he added five days to the year, making it to consist of 365 days.

Q. Why was this called a solar year?

A. Because it was supposed to be the time the sun took to go round the earth, as the ancient astronomers believed the earth to be stationary, and that the sun with the planets moved round it.

Q. When did Thales live?

A. In the fourth year of the forty-eighth Olympiad, 625 years before Christ.

Q. Did this number of days in the year make it agree with the solar year?

A. No; because the earth goes round the sun in 365 days and nearly six hours, and when the next change took place it was found that the year was many days behind the sun, as every four years the six hours made another day.

Q. Did the Romans adopt the division of the year used by the Greeks?

A. Not at first; Romulus, the founder of Rome, divided the year into ten months, imagining the sun made his course in that time.

Q. What alteration did Numa make?

A. He added two months more, making the year consist of 355 days; but afterwards, attempting to imitate the Greeks, he added months and days, till in the time of Julius Cæsar, there had been sixty-five days added.

Q. By whom was the next change made?

A. It was made by Sosigenes the Egyptian astronomer, who lived in the time of Julius Cæsar, first Emperor of Rome.

Q. What was the year called in which the alteration was made by Sosigenes?

A. The year of confusion; there were fifteen months in it.

Q. In what way did Julius Cæsar provide for the six hours?

A. He ordered that every fourth year

should have 366 days; it was to be called Bissextile or leap-year. This is called the Julian year, and took place in the year of Rome 708, about forty-three years before Christ.

Q. What is meant by bissextile?

A. The word bissextile is derived from *bis*, twice, and *sextus*, sixth; because in leap-year, the 24th of February came twice over, or there were two 24ths of February.

Q. Why was the 24th of February called the sixth?

A. Because one of the divisions of time among the Romans was into calends, and the 24th of February was the sixth of the calends. From this word calends, the different divisions of time among the Romans were called the calendar.

Q. Did anything after this occur to require change?

A. Yes; it was found that, by adding a day every four years, the Julian year became, in 1600 years, eleven days before the sun.

Q. What was the cause of this?

A. The earth takes 365 days, 5 hours,

48 minutes, 57 seconds, and 39 t to go round the sun, forming a or astronomical year, consequently i eleven minutes less than six hours e year; these eleven minutes had ca the error of eleven days in the calenda

Q. What nations had used the Rom calendar by this time?

A. Most civilized nations.

Q. Who discovered this error?

A. Pope Gregory; he discovered it b finding that the sun entered Aries on th 10th of March instead of on the 21st, at the vernal or spring equinox; at which time the astronomical year begins.

Q. How did he set it right?

A. By throwing out eleven days; so that the fourth of October was called the fifteenth, and so on. It was in October, 1512, that the New Style, as it is called, commenced on the continent; but it was not acknowledged in England till the year 1752.

Q. What changes would have arisen if the error in the calendar had not been discovered?

A. The seasons would have changed
ir time of appearing: we should have
l Midsummer in May, and Christmas-
y in November.

Q. What did Pope Gregory arrange to pre-
it this error from occurring in future?

A. He ordered that leap-year should
omitted at the close of a hundred
rs, if the date of the year would
divide evenly by four; thus 1600 was
ap-year, but 1700, 1800, were not.

Q. Cannot leap-year be found by divid-
the date of the year by four?

A. Yes; 1850 is not a leap-year, because
en divided by four there is a remain-
; but 1852 leaves no remainder, and
l, therefore, be leap-year. $4)\frac{1850}{462}-2$ $4)\frac{1852}{463}$.

Q. What is a lunar year?

A. It consists of twelve lunar months;
ing which time the moon passes
lve times round the earth. A lunar
nth is about twenty-nine days and a
.

Q. What is a calendar month?

A. The twelfth part of a year; some of
calendar months consist of thirty and

some of thirty-one days; February has twenty-eight, excepting leap-year, in which it has twenty-nine.

Q. Is the division of years into months very ancient?

A. Yes; but the earliest account is in the Bible, in the description of the time that Noah remained in the ark, and afterwards in the wanderings of the Israelites through the wilderness.

Q. What were the names of the Jewish months?

A. Nisan, or Abib, answering to part of our September and October, as the Jewish year began at the first full moon after the 21st of September—

Jair, or Zius,	— answering to our	November.
Siban, or Siwan,	—	December.
Thamuz, or Tamuz,	—	January.
Ab,	—	February.
Elul,	—	March.
Tisri, or Ethanim,	—	April.
Marchesvan, or Bul,	—	May.
Cisleu,	—	June.
Tibeth,	—	July.
Sabat,	—	August.
Adar,	—	September.

Q. Had not other nations names for their months?

A. Yes; but none are of importance excepting the Roman names; as from them our English names are derived, and they are all named from some particular cause. Januarius, — January, was so called from Janus, the god of the year, who is represented with two faces, one looking forward, the other backward.

January—being the first month, was supposed to be the time in which persons looked forward to the new year, and back upon the old.

Februarius — February, from a feast called Februa, held by the Romans in that month.

Martius—March, because this being the first month formed by Romulus, he gave it the name of his supposed father, the god Mars.

Aprilis—April, is derived from the Latin Aperio, to open, because the earth then opens her bosom for the production of fruits and vegetables.

Maius—May, from the goddess Maia, the mother of Mercury, whom the Romans worshipped on the first of May.

Junius—from the goddess Juno, the wife of Jupiter, and queen of heaven.

The remainder of the months took their names from their numbers, reckoning from March, which Romulus made the first month.

Quintilis, the fifth,	July.
Sextilis, the sixth,	August.
Septembris, the seventh,	September.
Octobris, the eighth,	October.
Novembris, the ninth,	November.
Decembris, the tenth,	December.

Q. Were the fifth and sixth months always called Quintilis and Sextilis?

A. No; Julius Cæsar being born in the month Quintilis, it was named Julius, in honour of him. Sextilis was changed to Augustus in honour of Augustus Cæsar, who was born in that month. From these names come our July and August.

Q. What is supposed to have occasioned the division of time into weeks?

A. The four changes of the moon during her revolution round the earth, each of which takes rather more than seven days; it has always been used by the Syrians, Egyptians and most Eastern na-ions, but was not introduced into Europe until the establishment of Christianity.

Q. What were the divisions of the month among the ancient Greeks and Romans?

A. The Romans reckoned by ninths, and he Greeks by decads or tenths; but some ancient writers assert that the seventh day was honoured by these and other nations.

Q. Where do we read the earliest account of a week?

A. In the Bible, at the creation; where t is stated that God created the world and all it contained in six days, and rested on the seventh day and blessed it.

Q. Is it not most likely that this ordination of God was the real origin of the division of time into weeks?

A. Yes; as all nations are descended from Noah, and the Israelites, the chosen people of God, were for four hundred years captives among the Egyptians.

Q. Had the Jews names for the days of the week?

A. No; the Sabbath was the seventh day—the next day was called the first of he Sabbath, the following the second, and so on, except the sixth, which was called the preparation for the Sabbath.

Q. What names were given by the ancient heathens to the days of the week?

A. The names of the seven planets then known, thus:—

Dies Solis,	Sun-day.
Dies Lunæ,	Moon-day.
Dies Martii,	Mars-day.
Dies Mercurii,	Mercury's-day.
Dies Jovis,	Jupiter's-day.
Dies Veneris,	Venus-day.
Dies Saturni,	Saturn's-day.

Q. Are not the French names of the days of the week derived from these?

A.—Dies Lunæ,	Lundi.
Dies Martii,	Mardi.
Dies Mercurii,	Mercredi.
Dies Jovis,	Jeudi.
Dies Veneris,	Vendredi.
Dies Saturni,	Samedi.

Q. From what are our English names derived?

A. From the names of the gods and goddesses, whom the Saxons worshipped on particular days of the week: they worshipped the sun and moon on Sunday and Monday, Tuesco on Tuesday, Woden on Wednesday, Thor on Thursday, Friga on Friday, and Seater on Saturday.

Q. Who was the greatest of these gods?

A. Woden, whom they worshipped on Wednesday. Friga was the wife of Woden and mother of Thor, who was next to his father in greatness.

Q. How many weeks are there in a year?

A. Fifty-two weeks and one day; in eap-year there are 52 weeks and 2 days.

Q. How did the ancient Romans divide their months?

A. Into calends, ides, and nones. The calends were the first day of every month, the nones the seventh, and the ides the fifteenth days of March, May, July, and October; in every other month the nones were on the fifth, and the ides on the thirteenth.

Q. How were the days reckoned?

A. They were counted backwards; the sixth of March, instead of being the sixth of the calends, was the first, or one day before the nones; and the eighth of May, nstead of being called the second of the nones, was the sixth before the ides.

Q. What is generally understood by the term artificial day?

A. The time in which we have light; and continues from sunrise to sunset; but the natural day is the time in which the earth turns round on its axis once, and consists of twenty-four hours.

Q. Do all nations begin their day at the same time?

A. No; the Babylonians, Persians, Syrians, modern Greeks, and other eastern nations begin their day at sunrise.

Q. What nations begin their day at sunset?

A. The Jews, Athenians, Italians, Austrians, Bohemians, and Chinese.

Q. When do the Arabians commence their day?

A. At noon; and the Egyptians and Romans, with the modern English, French, Dutch, Germans, Spaniards, and Portuguese, at midnight.

Q. How is the artificial day divided?

A. The Greeks divided the time of light into twelve equal parts; this they learnt from the ancient Egyptians; the

Jews do the same; consequently each of these twelve parts, or hours, must be longer in summer than in winter. They are called unequal hours.

Q. When was the division of the day and night into twenty-four hours known to the Romans?

A. Not till after the first Punic war; the Romans did not then as now begin their day at midnight, but gave twelve hours for day and twelve for the night.

Q. When did their day begin?

A. At six in the morning; the hours of the day were reckoned from this time —nine o'clock in the morning was called the third hour of the day, twelve o'clock the sixth, three o'clock the ninth, and so on.

Q. How were the twelve hours of the night divided?

A. Into four watches of three hours each; the first ended at nine o'clock, the second at twelve, the third at three, and the fourth at six, when day commenced.

Q. Can any passages in the New Testament be explained by knowing this?

A. Yes; it is stated, that when our Saviour was crucified, there was darkness over the earth from the sixth to the ninth hour; this was from twelve o'clock to three in the afternoon.

Q. To what other passage does it refer?

A. To that in which our Saviour is said to have walked on the sea to his disciples in the fourth watch of the night; this must have been between three and six o'clock in the morning.

Q. Why should this division of time among the Romans apply to the time of our Saviour?

A. Because Judea was then a Roman province, and many of their laws and customs had become common among the Jews.

Q. Have not some particular days in the year been observed by all nations?

A. Yes; either in honour of their religions, their laws, or their great men—days in honour of religion are generally either feast days or fast days.

Q. What were the principal feasts among the Jews?

A. The Sabbath, the feast of Weeks, the feast of Pentecost, and the feast of the Passover. Some of our fasts and festivals occur at the time of these Jewish feasts.

Q. Is the Christian Sabbath the same day as the Jewish?

A. No; the Jewish Sabbath is the seventh day of the week, being the day on which God rested, after the six days of creation. Our Christian Sabbath is on the first day of the week, being the day on which Christ rose from the dead.

Q. What Christian festival occurs at the time of the Jewish Passover?

A. The festival of Easter, on which day Christ rose from the dead. It is the third day after Good Friday, on which day we commemorate his crucifixion, which took place the day before the Jewish Passover.

Q. Does Easter Sunday always take place on the same day of the year?

A. No; it depends upon the moon, Easter being the first Sunday that follows the first full moon after the 21st of March.

Q. Do not many of the other fasts an festivals depend upon Easter?

A. Yes; and they are therefore calle moveable feasts. Ash-Wednesday, the first day of Lent, must be forty days before Easter; Palm-Sunday, a week before; Whit-Sunday, seven weeks, and Trinity-Sunday eight weeks after.

Q. When was this arrangement for Easter made?

A. By the early Christians, at the Council of Nice, a town in Germany, in the year 325.

Q. Why is the first day of Lent called Ash-Wednesday?

A. Because the early Christians used to put ashes on their heads, as a token of humility.

Q. When is Lent?

A. It is the time between Ash-Wednesday and Easter.

Q. Why did the Council of Nice order Easter to be held at this time?

A. To avoid holding it on the same day as the Jewish Passover, which was always held on the day of the full moon.

Q. How did it happen that the two asts occurred together?

A. Because our Saviour was crucified t the time of the Jewish Passover. The reeks and Làtins call it Pascha, ori-inally a Hebrew word signifying to ass over.

Q. What was the origin of the Passver?

A. It was ordained by God, in comemoration of the destroying angel passng over the dwellings of the Israelites, hen he destroyed all the first-born of he Egyptians, among whom they dwelt.

Q. From whence came the name aster?

A. The ancient Britons had a Saxon oddess of the name of Eastra, whom hey worshipped in April, and the Chrisian festival of Easter occurs generally in pril.

Q. When is Palm-Sunday?

A. The Sunday before Easter: it is in ommemoration of Christ's entry into erusalem; when the people strewed the ay with palm branches.

Q. When does Whit-Sunday occur?

A. It is the seventh Sunday after Easter: it was originally called White-Sunday, because those newly baptized wore white garments.

Q. What Jewish feast occurs at this time?

A. The feast of Pentecost, when the Jews, from different parts of Judea, had to meet at Jerusalem.

Q. On what account do we keep this day?

A. In commemoration of the Spirit being poured out on the Apostles on this day, while they were at Jerusalem.

Q. What is Holy-Thursday?

A. The day on which our Saviour ascended to heaven: it is called Ascension-day, and is held ten days before Whit-Sunday.

Q. When is Trinity Sunday?

A. The Sunday after Whit-Sunday; and this is the last of the moveable feasts.

Q. Mention some feasts which always occur at certain days.

A. Lady-day, Midsummer-day, Michaelmas-day, and Christmas-day; also many days kept in honour of the saints.

Q. What are these days intended to commemorate?

A. Lady-day was originally called Our Lady's Day, because on that day the angel Gabriel told the Virgin Mary she should be the mother of Jesus Christ. It is called Annunciation-day, and occurs on the 25th of March.

Q. When is Midsummer-day?

A. On the 24th of June: it is the festival in honour of St. John the Baptist. Michaelmas-day is on the 29th of September, and is in honour of St. Michael. Christmas-day is the commemoration of the birth of Christ, and is on the 25th of December.

Q. What is Twelfth-day?

A. Old Christmas-day, or the twelfth day after Christmas. When Pope Gregory threw out eleven days to rectify the Calendar, no one liked to forget the day on which Christmas had been kept; they therefore kept both, and the practice has been usual ever since.

Q. Is there not another feast on Twelfth-day?

A. Yes; the feast of the Epiphany.

Q. Of what other use are these days?

A. They are called quarter-days, and divide the year into four. On these days, matters of business, rent, and other things are frequently settled.

Q. How can Easter-Sunday be found for any year?

A. By finding the cycle of the sun, or Sunday; the cycle of the moon, the epact, the golden number, the dominical letter, and the Easter limit.

Q. What is the cycle of the sun?

A. It is a period of twenty-eight years, at the end of which time the days of the week, Easter, and other feast-days return to the same days of the month.

Q. What is a cycle of the moon?

A. A period of nineteen years; at the end of which time the new and full moons fall on the same days of the month.

Q. How is the cycle of the sun found?

A. By adding 9 to the given year, and

dividing by 28, the remainder will be the sun's cycle.

Q. Why is 9 added to the year?

A. Because the first cycle was commenced nine years before Christ.

Q. How do you find the cycle of the moon?

A. By subtracting 1500 from the given year; because the first cycle is reckoned from the year 1500. Then divide by 19, and the quotient is the number of cycles that have elapsed since 1500: the remainder is the golden number.

Q. What is the golden number?

A. The number of years since the completion of the last cycle of the moon. The golden number for the year 1850 is thus found:—

1850
Subtract 1500
Divide 19) 350 (18 number of cycles.
19
160
152
8 golden number.

Q. Why is it called the golden numbe

A Because when Meton, the Athenia discovered it, the people were so please that they had it written in letters o gold, and hung up in the market-place.

Q. What is the epact?

A. The difference between a solar and a lunar year. A lunar year of 12 months contains only 354 days, and a solar year 365; there is therefore a difference of 11 days in the first year of the moon's cycle, 22 in the second, and so on.

Q. What is done with the number of these days when they get above 30?

A. They are divided by 30; the remainder will be the epact.

Q. What is the dominical letter?

A. One of the first seven letters of the alphabet, which are used for the seven days in the week: as the first of January and the last of December fall on the same day of the week, the letter for Sunday changes every year.

Q. How is the dominical letter found?

A. By first dividing the given year by 4, and adding the fourth part and 6 to it.

This amount must be divided by 7, and what is over taken from 7; the remainder is the number of the dominical letter.

Q. How are the letters numbered?

A. As follows:—

A	1	E	5
B	2	F	6
C	3	G	7
D	4		

Q. What is the Easter limit?

A. The number of days from the first of March to Easter-day, both included. By the Easter limit, the epact, the golden number, and dominical letter, Easter-day can be found for any year.

Q. Find on what day of the year 1852 Easter-day will fall.

A. First find the golden number thus, as in page 29:—

```
         1852
         1500
         ----
   19 ) 352 ( 18
        19
        ---
        162
        152
        ---
         10 golden number.
        ---
```

To find the epact, subtract 1 from the golden number, and multiply by 11; if the total be above 30, divide by 30: the remainder is the epact.

Golden number 10
1
9
11
3,0) 9,9
3 — 9 epact.

The Easter limit is then found by adding 6 to the epact, and subtracting the sum from 50: the remainder is the Paschal full moon, or Easter limit. Thus:—

Epact 9	50
6	15
15	35 Easter limit.

Then, for the dominical letter, divide 1852 by 4, thus, as described in p. 30:—

4) 1852
463
6
7) 2321
331 — 4

4 subtracted from 7 leaves 3, which is the number of the dominical letter. The dominical letter for the year 1852 will be C.

To find Easter-day, 4 must be added to the number of the dominical letter, and the sum subtracted from the limit.

$$\begin{array}{lr@{\qquad}lrl} \text{Dom. letter} & 3 & \text{Easter limit} & 35 & \\ & 4 & & 7 & \\ \hline & 7 & & 28 & \text{remainder.} \\ \hline \end{array}$$

The remainder, 28, must be subtracted from the next highest number which will divide even by 7: this number must be 35.

$$\begin{array}{r} 35 \\ 28 \\ \hline 7 \\ \hline \end{array}$$

The remainder, 7, must be added to the Easter limit, and the whole to the 1st of March. If the 31 days in March are then subtracted from it, the day in April on which Easter day falls will be found.

$$\begin{array}{rrl} \text{Easter limit} & 35 & \\ & 7 & \\ \cline{2-2} & 42 & \\ \text{31 days in March} & 31 & \\ \cline{2-2} & 11 & \text{day of April.} \\ \cline{2-2} \end{array}$$

Easter Sunday will therefore fall on the 11th of April, in the year 1852.

Q. Will not 1852 be leap-year?

A. Yes; there will therefore be two Sunday letters; one used until the 29th of February, and one after.

Q. What letter is used before the 29th of February?

A. The letter following the dominical letter of the year; thus, the Sunday letter for 1852 is C, and therefore, till after the 29th February, D will be used.

Q. Are there not tables in prayer-books, and other books, by which Easter Sunday may be found?

A. Yes; but it is sometimes amusing to find these things by our own working, and for this purpose the rules are given to those young people who may be proud of doing it themselves.

CHAPTER II.

COINS, WEIGHTS, AND MEASURES.

Section 1.—*Coins and Money.*

ENGLISH AND FOREIGN.

Q. WHAT is money?

A. Money is anything which we exchange for food, clothes, or articles we wish to possess; but it is generally understood, among European nations, to be stamped coins.

Q. What is barter?

A. Barter is exchanging one thing, of the same value, for another; it is entirely used now by uncivilized nations, who will give the produce of their country to strangers, in exchange for beads, nails, and steel articles.

Q. Was barter practised among the ancients?

A. Yes; Homer describes the golden armour of Glaucus to have been worth one hundred oxen, and that of Diomede ten.

Q. To whom do the Greeks ascribe the invention of money?

A. To the wife of Midas, king of Phrygia, who is said to have had the power given him by Bacchus, of turning everything he touched into gold.

Q. What is the earliest account we have of the use of money?

A. That in the Bible, where it is said Abraham gave four hundred shekels of silver for a burial-place for his wife Sarah. Josephus, who wrote a history of the Jews, ascribes the invention to Cain.

Q. To whom is it ascribed by the Romans?

A. To Janus, the god of the present, past, and future. They called it *pecunia*, the Latin name for money, either because their chief wealth was cattle, or because, as Pliny says, their first coin was stamped with a cow; *pecus* being the Latin word for cattle.

Q. What are the metals most used for coin?

A. Gold, silver, and copper; but, in the earlier ages, iron rings, leather, and even wood, were used for money. Copper was first used, then silver, and lastly gold.

Q. When was the first silver money coined in Rome?

A. In the year of Rome 484 B.C. Gold was not coined till 100 years after.

Q. Was money always in round pieces, as it is now?

A. No; and even now in Spain it has many corners, and in some parts of India t is globular, like a ball.

Q. What is usually stamped on money?

A. The head of the king of the country to which it belongs. In ancient mes, different nations stamped different things on their money. The Jews d the golden pot of manna on one side their shekel, and Aaron's rod on the ıer.

Q. When were representations of the ds of great men first stamped on ıs, in Rome?

. Not till after the fall of the com-wealth. Many nations had the figure horse, an owl, or an ox; but now all nations have the head of their king, or prince stamped on their coins, except the Mahometans, who detest images; they inscribe only the *name* of their prince.

Q. From whom did the Britons learn to coin money?

A. From their conquerors the Romans. The earliest English coin was made in the reign of Ethelbert, first Christian king in Britain; money then began to be reckoned in pounds, shillings, and pence.

Q. From what was the term penny supposed to be derived?

A. From the word *pecunia*, money, or *pondo*, weight, on account of the penny then weighing as much as three of ours. Five of these pennies made a scilling.

Q. What is supposed to be the origin of the word scilling?

A. Most likely from the scilingus, or the fourth part of an ounce.

Q. What is the origin of the word sterling, applied to money?

A. In the time of Richard the First, money coined in the eastern parts of

many became very valuable, on ac-
nt of its purity. The people were
ed Easterlings, and were sent for to
land to improve the English coins:
money thus coined was at first called
terling, and now sterling.

. From whence arose the words
ning and halfpenny?

. The Norman kings had a penny
ed with a very deep cross in it, so
it could be broken into halves, called
pennies, or fourth parts, called fourth-
s, from whence our word farthing is
ved.

.. When was gold first coined in
land?

. In the year 1320, in the reign of
vard the Third. Most of the countries
Europe began to coin money about
time. The first pieces were called
entines, as they were coined in
ence.

. When were shillings coined?

. In the reign of Henry the Seventh.
wns and halfcrowns, in the reign of
es the First.

Q. What gold coins were used at first in England, besides Florentines?

A. Nobles, worth 13*s.* 4*d.*; rose-nobles, 6*s.* 8*d.*; then guineas, worth 21*s.*; and half-guineas, worth 10*s.* 6*d.* But the gold coins now in use are sovereigns, worth 20*s.*, and half-sovereigns, worth 10*s.*

Q. What were the ancient silver coins?

A. The most ancient was a mancus, worth 30 pennies of those days, or 90 of ours. It is thought by some to be a mark; but a mark was 13*s.* 4*d.* The mancus was sometimes of gold. Our silver money is now, shillings, sixpences, half-crowns, crowns, and fourpenny pieces.

Q. Has any silver money of less value been coined?

A. Yes; threepenny pieces, twopenny and even penny pieces.

Q. What gold coins are used in France?

A. The louis d'or, the half louis d'or, and the quarter louis d'or: the first worth 16*s.*, the second 8*s.*, and the third 4*s.* Before the year 1700 they had gold lys, and écus, or crowns, but they are not now used.

Q. What are the silver coins?

A. The franc, worth twenty sous, or about ten pence; the half-franc, the double-franc, and a piece, like our crown, of five francs, worth 4*s.* 2*d.*

Q. What are the copper coins?

A. Sous, double-sous, and cents. A sous is not quite the value of an English halfpenny, and a cent is the 1-hundredth part of a franc; there are five cents to a sous.

Q. What are the coins most in use in Germany, and other countries?

A. In Germany, Flanders, Holland, and America, they use dollars, rix-dollars, ducats, and ducatoons; the florin, the stiver, the shilling, and the kreutzer and fenin.

Q. Which of these are gold?

A. The ducat, worth £6 15*s.* (a silver ducat is worth 7*s.* 6*d.*), and sometimes the florin, worth 2*s.* The silver coins are dollars and rix-dollars, each worth about 5*s.*, the florin, and the shilling. The

Flemish shilling is worth 7½*d.* and the Dutch three halfpence.

Q. Which are the copper coins?

A. The stiver, worth five farthings; the kreutzer, worth little more than a halfpenny; and the fenin. Three fenins are worth one farthing.

Q. Have other European nations coins besides some of these?

A. Yes; in Italy, Spain, and Portugal they have pistoles, moidores, and doubloons; all of gold. The moidore is worth 27*s.*; the pistole, twice as much; and the doubloon is a double pistole, it is therefore worth £5 8*s.*

Q. Of what were the coins of ancient Rome and Greece made?

A. Of gold, silver, and brass. From the Roman names for their money, the letters £ *s. d.* are derived by the English. £ stands for *libræ*, pounds; *s.* for *solidi*, shillings; and *d.* for *denarii*, pence.

Q. What are the Jewish coins mentioned in the Bible?

A. The gerah, worth about three halfpence; the bekah, worth 1*s.* 1½*d.*; the shekel of silver, worth 2*s.* 3*d.*; the talent of silver, worth £342 3*s.* 9*d.*; the talent of gold, worth £5,475.

Q. What are bank notes?

A. Bank notes, or bills, are pieces of a peculiar sort of paper, made for the purpose, on which certain sums of money are stamped, and they are circulated instead of coins.

Q. What is the lowest amount now printed on a bank note?

A. Five pounds; the next amount is for ten pounds; the next, twenty; as the amount increases by tens.

Q. Where are bank notes made?

A. At a place called the Bank of England. The word bank comes from the Italian *banco*, a bench, because the ancient money-changers sat on benches in the market-place to transact their business.

Q. Which is the most ancient bank for money?

A. The Bank of Venice, in Italy: it is also the most considerable, all others are imitations of it.

Section 2.—Weights and Measur

Q. Of what use are weights measures?

A. They enable people to divide equ what they wish to buy or sell.

Q. What are the different weights?

A. Troy weight, Avoirdupois weigh Wool weight, and Apothecaries' weight.

Q. For what is Troy weight used?

A. For weighing gold, silver, jewels seeds, and liquors. By one of the chapters in Magna Charta it is ordered that the same weight should be used all over England, but Avoirdupois is now used for all articles that waste in weighing.

Q. How was the weight of a pound decided?

A. It was found that 24 grains of wheat weighed exactly as much as an ancient silver penny, and twenty of these pennyweights made an ounce. The word ounce is derived from the Latin *uncia,* the twelfth part of anything.

Q. Of what is an ounce the twelfth part?

A. Of a Troy pound: there are twelve ounces in a pound Troy weight, but sixteen in a pound Avoirdupois weight; this allows for any waste.

Q. Mention some articles weighed by Avoirdupois weight?

A. Groceries, tallow, hemp, flax, and all metals, except silver and gold.

Q. What is the use of Apothecaries' weight?

A. It is used by druggists and medical men, to mix their medicines, but they buy and sell their drugs by avoirdupois.

Q. What is the scruple, used in Apothecaries' weight?

A. A scruple weighs twenty grains of wheat: the word is derived from the Latin *scrupulus*, the smallest of the Roman weights.

Q. From what is the word dram derived?

A. From the Latin word *drachma*, the eighth part of an ounce: it is also supposed to be the weight of a Roman silver penny.

Q. For what is Wool weight used?

A. Only for weighing wool: the po
are the same as avoirdupois, but diffe
names are given to certain numbers
these pounds: 7 lb. is a clove; 14 lb
stone, and so on.

Q. From what are these terms derive

A. The origin of most of them is
known; some have supposed that
word tod is derived from the French w
toilet, a wrapper, in which two stones,
28 lbs., are generally wrapped.

Q. What were the weights among
Greeks and Romans?

A. The highest weight was a lib
weighing about eleven of our ounc
this was divided again into lesser weigh
the smallest a lentes, or scruple, scarc
weighing half a grain.

Q. What are the principal Jewi
weights?

A. The shekel, weighing about half
ounce; the maneh, about 2 lbs.; and t
talent, nearly 114 lbs.

Q. Are the French weights similar
ours?

A. The French use the pound weig

d they have also half and quarter-
und weights. In Paris the pound has
ounces; in Lyons, 14; and in Tou-
ıse and Marseilles, 13 ounces: but a
und of silk, in Lyons, has 16 ounces.

Q. Are French and English weights
nerally used all over Europe?

A. Yes; but many nations have others
culiar to their own country, as well as
English pound and ounce.

Q. How was long measure decided?

A. By the length of a grain of barley,
ken from the ear when quite ripe; it
is found that three of these barleycorns
uld measure one inch, which is the
elfth part of a foot.

Q. For what is long measure used?

A. For measuring lengths and dis-
nces. For measuring land, the terms
leagues, miles, furlongs, poles, yards,
t, inches, and barleycorns.

Q. From what is the word league
rived?

A. It is supposed to be derived from
word *leuca*, white, because the
mans marked the distances on their

roads with white stones. An E league measures three miles, the F only two.

Q. From what is the word mile rived?

A. From the Italian words *mille pa* a thousand paces, because the Ita mile measured a thousand geometr paces, or steps. An English mile m sures eight furlongs, or 1,760 yards.

Q. Who determined the length of yard?

A. Henry the First: it was the lengt of his own arm. A yard measures 3 fee or 36 inches.

Q. What is the length of a fathom?

A. Six feet: the depth of the sea i generally measured by a line divided int fathoms.

Q. What were the ancient measure among the Greeks and Romans?

A. They had different names; but th Greeks used a measure called *pous*, a foot measuring about 13 inches. The Roman *pes*, a foot, measured 11 inches.

Q. What was the length of a Roman *miliare*, or mile?

A. About three-quarters of an English mile. The Grecian *milion*, or mile, was a few feet less.

Q. What are the Jewish long measures mentioned in the Bible?

A. The digit, about three-quarters of an inch; the palm, nearly 4 inches; a span, 11 inches; and a cubit, 22 inches. The giant, Goliath of Gath, must therefore have measured above 11 feet.

Q. What other measures had the Jews?

A. The fathom, measuring nearly 7½ feet; and the measuring-line, 145 feet, a abbath day's journey, mentioned in the Bible, was about three-quarters of an nglish mile.

Q. How is the yard divided for mea- ring cloth, linen, &c.?

A. Into halves and quarters: half a d measures 18 inches; and a quarter, The quarter is divided into four nails, measuring 2¼ inches.

Is the yard used as a measure all Europe?

A. No; the French use a mêtre, suring about 1¼ yard, and an ell, m ing 1½ yard; this ell, with the E and Flemish, is used in Holland, Flan Sweden, Switzerland, and great pa Germany.

Q. What does an English ell n sure?

A. A yard and a quarter; a Flemi three-quarters of a yard.

Q. What is the general width of Engli goods?

A. Some goods are a yard wide; bu the English, French, and Flemish ell are also used for many articles. French goods are usually ell wide.

Q. What are the usual measures fo liquids?

A. Ale, beer, and wine measures. These all have pints, quarts, and gallons: the larger measures are only different in the number of gallons they contain.

Q. How many gallons does a barrel o beer contain?

A. Thirty-six; a barrel of ale, 32; and a barrel of wine, 31½.

Q. What is the difference in the hogshead?

A. A hogshead of wine contains 63 gallons; of ale, 64; and of beer, 72.

Q. Why is this difference?

A. Because the quantity of a hogshead is decided by its weight, and some liquors weigh heavier than others.

Q. What were the ancient Jewish measures for liquors?

A. The hin, measuring a gallon and a half, and the ephah, rather more than 7 gallons.

Q. Are not pints, quarts, and gallons used for measuring dry goods?

A. Yes; for corn, fruits, and some vegetables. Coals were originally measured; now they are weighed by avoirdupois weight, if sent within twenty-five miles of London.

Q. What are the measures used in dry measure?

A. Pints, quarts, gallons, pottles, pecks, bushels, and strikes. The pints, quarts, and gallons are the same as liquid measures.

Q. What is the measure of a pottle?

A. Two quarts, or half a gallon. There are 2 gallons to a peck; 4 pecks to a bushel; and 2 bushels to a strike.

Q. What is supposed to be the origin of these words?

A. Most of them are likely to be the old Saxon names for the vessels used for measuring. The word pint is said to be derived from the Greek word *pinta*, a vessel.

Q. What is the origin of the word quart?

A. It is from quarter, a quart being the quarter, or fourth part of a gallon.

Q. What were the dry measures used among the Jews?

A. The hin, measuring 9 pints; the cab, 2½ pints; the gomer, 5½ pints; and the ephah, 3 pecks and a pint.

CHAPTER III.

PRODUCTIONS OF THE EARTH USED FOR FOOD, MEDICINE, AND MANUFACTURES, ETC. ETC.

Section 1.—*Useful Seeds, etc.*

ENGLISH AND FOREIGN.

Q. WHAT is considered the most useful European plant?

A. Wheat, or corn: it has been used in all ages to make bread, although in some countries the grain is very different to ours.

Q. What is included, besides wheat, in the word corn?

A. Barley, oats, and rye: bread has been made of all these in olden times, when wheaten bread was considered a luxury; and even now among the poor, especially in Scotland, oaten cakes are eaten as a common food.

Q. In what country was corn first cultivated?

A. In Egypt, which was anciently the

most fertile of all other countries in corn. From Egypt it passed to Greece, Italy, and the other countries of Europe.

Q. Who is said to have taught the cultivation of corn to the Greeks?

A. Ceres, a Sicilian woman, and for this she was placed among the gods, and is called the goddess of agriculture.

Q. What is maize?

A. Indian corn: it is also cultivated in America, and yields two crops a-year.

Q. In what countries is corn now generally produced?

A. In all European countries; in Egypt, Barbary, and some other parts of Africa; and in most parts of America, when cultivated by Europeans.

Q. In what way is corn prepared to make bread?

A. It is ground into flour, after the corn has been freed from the shell, or husk: this husk, when ground, is called bran.

Q. What is brown bread?

A. Bread made of flour in which the corn has not been separated from the shell. The flour of barley and oats is called meal.

Q. Of what other use is flour?

A. Besides using it as we do for pastry, the Italians make of it semolina, macaroni, and vermicelli.

Q. How are these made?

A. Semolina is merely the flour rolled into little grains: it is used for puddings. Macaroni and vermicelli are made of flour mixed with the white of eggs.

Q. In what shape are they made?

A. Vermicelli is in the form of long thin threads, like worms; macaroni, like a small pipe.

Q. What is the cause of this difference?

A. Vermicelli is forced through holes as small as possible, but macaroni through holes the size of a pea. Macaroni is sometimes made in the form of thin broad ribbons; it is then called sassagna.

Q. Of what are wafers made?

A. Of flour, isinglass, and yeast. When coloured with red-lead they are injurious, as red-lead is poisonous.

Q. When was baking first introduced into Rome?

A. After the war with Pyrrhus, 500 years after the building of Rome: every wife was then her own baker.

Q. Have we not earlier accounts of baking than this?

A. Yes, in the Bible; and it is most likely that the Greeks, who introduced it into Rome, brought their knowledge from Egypt.

Q. What other useful articles are made from wheat?

A. Starch, with which we stiffen linen; it is made by soaking wheat in water, and afterwards exposing it to the heat of the sun: the slimy sediment left at the bottom of the water is cleaned and dried in an oven, and is called starch.

Q. Of what other use was starch, in olden times?

A. Hair-powder was made from it: ladies and gentlemen then covered their hair with powder, till it looked quite white; now it is very seldom used.

Q. For what are oats now used?

A. Principally for horses; and barley for poultry: but the greatest use of barley is to make malt, of which, when mixed with hops, beer is made. Barley grows wild in Sicily.

Q. Of what other use are oats?

A. When free from their husks they are called groats, and are used to make gruel for sick persons.

Q. Of what use is rye now?

A. It is seldom used now to make bread, except among the very poor, but principally in the distillation of spirits.

Q. What is pearl barley?

A. Barley without the shell, or husk.

Q. What are hops?

A. The flower-buds of a beautiful plant, which grows to a great height, twining round long poles. The best hop-grounds are in Kent.

Q. Of what use is barley in making bread?

A. No bread can be made without yeast, which is the fermentation of malt. Beer and wine are also fermented with yeast.

Q. What is porter?

A. A peculiar sort of beer, first invented by a brewer of the name of Harwood: the porters and working men drank so much, because it strengthened them, that it was in time called porter.

Q. What name was given, by the Egyptians, to liquor made from barley?

A. Barley-wine: it was also a favourite drink of the Anglo-Saxons.

Q. When were hops first used?

A. Hops were first used in the Netherlands, in the reign of Henry the Fifth; but not in England for 200 years afterwards.

Q. What is rice?

A. The seed of a plant, growing in Asia, and some parts of America. In China it yields two crops a-year, and is the principal food of the poor in Asia.

Q. Where does the best rice come from?

A. From Carolina, in North America: the grains are double the size of those that grow in the East Indies. Rice will not grow without plenty of water.

. What spirit is made from rice?

.. Arrack is partly made from it.

. What is millet?

.. A grain, growing in the East Indies, d for puddings, and for fattening ltry.

. What are carraway seeds?

.. The seeds of a plant growing in ex and Kent, and wild in Suffolk: ful in medicines and pastry.

. What are coriander seeds?

.. The seeds of a plant, also growing Essex and Kent, used by druggists, fectioners, and distillers. The smell taste of the plant is pleasant, but seed is very disagreeable.

. What did the ancients imagine ut this seed?

.. That the juice of the coriander seed ıld take away their senses.

. What are cardamoms?

.. Seeds brought from the East Indies ods: useful in medicine. The Indians them with the betel and chew them; also use a great quantity for food.

. From whence have we the best capers?

A. From the South of France: they grow without cultivation on a small shrub, and flourish most near ruins or in cavities of rocks.

Q. What is anise seed?

A. A seed used for medicine, growing wild in Egypt, Syria, and other Eastern countries.

Q. What is linseed?

A. It is made from the pods and seeds of flax, a beautiful plant growing in this country. From the fibres of the stalks linen is made.

Q. What is rape seed?

A. The seed of a plant which grows in a rich soil, in several parts of England. Oil is made from it, and oil-cakes for fattening cattle.

Q. From whence have we castor oil?

A. From the seeds of a plant called by the Americans, Palma Christi, growing in both the Indies. The seeds are pressed, and boiled in water till the oil rises to the top, which is carefully taken off and kept for use.

Q. *From* what is soy made?

A. From the seeds of a Chinese plant; but the seamen say it is made of beetles, because the seeds resemble them.

Section 2.—Plants and Shrubs.

Q. Where does the tea-shrub grow?

A. In China, Japan, and Siam: it is an evergreen, and the leaves are dried for use.

Q. What is the difference between the plants on which green and black tea grow?

A. Some travellers suppose it to be the same plant, but botanists tell us that the flower on the black tea-shrub has six petals, or leaves, and the green tea-flower has nine.

Q. What does the flower resemble?

A. Our wild rose; the root is like that of a pear-tree.

Q. Which is considered the most expensive tea?

A. That in which the leaves are gathered when very young. There are three seasons for gathering the leaves.

Q. When is the first?

A. In March, when the leaves are only

a week old; the second in April, and the third in June.

Q. How old must a tree be before the leaves can be gathered?

A. Three years; the finest shrubs are kept for the emperor of Japan: this is called imperial tea.

Q. What are the names given to black tea?

A. Bohea, congou, souchong, and pekoe.

Q. What are the names of the green teas?

A. Singlo, hyson, and gunpowder.

Q. How is tea prepared for use?

A. The leaves are roasted, and rubbed together between men's hands, or iron plates, to roll them. The more trouble taken with the tea, the more expensive it is.

Q. What is gunpowder tea?

A. The unopened leaf-buds: they are gathered and dried so carefully that they retain more of their flavour and colour. It is called gunpowder because it looks *like small shot.*

Q. Who first introduced tea into England?

A. A Dutch merchant, who obtained it from the Chinese in exchange for dried sage; and they will now give four pounds of tea for a pound of sage, they are so fond of it.

Q. In whose reign was tea introduced?

A. In the reign of Charles the Second, and was sold at fifty shillings a pound.

Q. What is coffee?

A. The berry of an evergreen shrub; when ripe it is red, something like our cherry. It is first dried, then roasted, and, before we can use it, ground to powder in a coffee-mill.

Q. Where does the best coffee come from?

A. From Arabia: Jamaica was the first of the West India islands in which coffee was planted.

Q. From what is chocolate made?

A. From the pulp of the cacao, or chocolate nut: it is mixed with sugar, cloves, cinnamon, and other spices.

Q. Where does the chocolate-tree grow?

A. In America and the West Indies: it has a beautiful flower, and the fruit is enclosed in a pod, something like a cucumber in shape. The nuts are like almonds, twenty or thirty in one pod.

Q. Who introduced it into England?

A. The Spaniards: the best comes from the Carracas, in the West Indies.

Q. What are cloves?

A. The dried buds of a small aromatic plant growing in the Moluccas.

Q. What is sugar?

A. The juice of the sugar-cane, a plant growing like a tall stick, with a bunch of green leaves at the top: it is brought from China and the West Indies.

Q. What is treacle?

A. The remains of the sugar syrup: it is sometimes called molasses. Rum is distilled from the molasses, when they have been skimmed off while the sugar boiled.

Q. What is arrow-root?

A. The root of a plant growing in the East and West Indies: it requires great preparation, and looks like starch when we see it.

Q. From what is its name derived?

A. From the use made of it by the Indians, the juice having the power of curing wounds made by poisoned arrows, &c. &c.

Q. What is pepper?

A. The berry of a creeping shrub; the berries grow in clusters, like currants, and are first green and then red.

Q. What is the difference between black and white pepper?

A. It is the same berry, which, when dried, becomes black. The white pepper has the black or outside skin peeled off.

Q. What is ginger?

A. The root of a reed-like plant growing in Calicut and many places in Asia and the West Indies; it spreads far under ground, and the plant is like a rush.

Q. In what way do the Indians use it?

A. When fresh it is soft, and eaten like a salad; it also makes a delicious preserve.

Q. What is the Orris root?

A. The root of a plant used as a perfume. It has the scent of the violet, and comes from Leghorn in Italy.

Q. What is Spanish liquorice?

A. A plant growing in Spain. The root and the juice are useful for medicine, also in making porter. Liquorice grows in England, but not in such great quantities as in Spain.

Q. Where do yams grow?

A. In America, they are the roots of a plant used by the Americans to feed their slaves. The root is very large, and something of the shape of a man's leg. Yams are sometimes boiled for food, or ground into flour.

Q. What are capsicums?

A. The pods of an American and Indian plant: they are of a shining red. Capsicums are very much eaten in hot climates, and may be seen in jars of India pickles.

Q. From what is cayenne pepper made?

A. From a kind of capsicum growing in Cayenne, a town in French Guiana, in South America.

Q. What is garlic?

A. The bulbous root of a plant which grows wild in Sicily; the smell is very rong and offensive, yet it is much eaten the Jews, and the lower class of French, anish, and Portuguese.

Q. Is it not valuable in medicine?

A. Yes, and the juice forms a very rong cement for broken glass. Leeks e a sort of mild garlic sometimes used r broth and soup. They grow wild in vitzerland. The Welsh wear leeks on . David's day, in honour of their patron int.

Q. Is there another kind of garlic?

A. Yes, shalots; much used by the ench in cookery. Onions which grow England are the roots of a plant having mild flavour of the leek, and used in ups and broths. Spanish onions are nsidered great delicacies.

Q. What is the Canadian onion?

A. A plant on which, instead of the root, e onion grows at the top of the stalk.

Q. Where do mushrooms grow?

A. They grow wild in England, in parks other places where the turf has not en ploughed for many years.

Q. What are morrels?

A. Another kind of fungus, used for broths and soups.

Q. What is madder?

A. The root of a creeping plant used by dyers and painters to dye fine red and other tints; it grows wild in South America; cows are very fond of madder, it makes their butter a fine yellow.

Q. What is flax?

A. The produce of a beautiful plant with slender stalks, small leaves, and blue blossoms. Of the fibres of the stalks linen and cambric are made.

Q. What island is famous for linen?

A. Ireland; it is also very perfect in Holland; cambric takes its name from Cambray in Holland, at which place it was first manufactured.

Q. What is hemp?

A. A useful plant growing in England, the fine fibres of the stalks are spun into coarse cloth and canvass, and the coarser are made into twine, ropes, cables, and cordage.

Q. What is done with the refuse of hemp?

A. It is called tow; it is very inflamable, and is used for stopping effusions f blood, and in lighting matches for annons.

Q. What is cotton?

A. The down or wool of the cotton-ee, growing in the East and West ndies, and lately cultivated in Europe. he wool grows in a pod which bursts hen it is ripe.

Q. What is the use of cotton?

A. It is spun into calicos, muslins, imities, and many other stuffs. One pecies of cotton-tree bears brown as well s white wool; the brown makes what is alled nankeen.

Q. From what is indigo produced?

A. From a beautiful plant growing in he East Indies. It dyes a deep blue; tone blue, used by laundresses, is pre-ared from indigo.

Q. Where is logwood found?

A. In Honduras in America; it grows forests near rivers, and produces a eautiful black or purple dye.

Q. What is woad?

A. A plant, producing a blue dye,

growing wild in Cambridge, Somersetshire, and Durham; the leaves are picked, softened, and made into little balls. The ancient Britons stained their bodies with woad.

Q. What is weld?

A. A plant cultivated in England, used to dye wool, cotton, and silk, a deep yellow. This colour is sometimes produced from the Turmeric root; but the best, called Indian yellow, is from the wood of a plant growing in India.

Q. When was tobacco first brought into England?

A. In the reign of James I., by Sir Walter Raleigh. It is the dried leaves of a beautiful plant growing in North America and the West Indies.

Q. From what does it take its name?

A. From Tobago, one of the Caribbee islands. Snuff is tobacco ground into powder.

Q. What other useful plant did Sir Walter Raleigh introduce?

A. The potato. Potatoes were brought to England by Sir Francis Drake, but Sir

Walter Raleigh first planted them in Ireland, at Youghall near Cork.

Q. Who first planted cabbages in England?

A. Sir Anthony Ashley,—he brought them from Holland. The plant from which cabbages, cauliflowers, and brocoli are now produced, was originally a sour sea weed, which has been thus improved by cultivation.

Q. In whose reign was this?

A. In the reign of Charles II. Beans, peas, artichokes, and asparagus were introduced into England about the same time; turnips were brought from Hanover and Germany.

Q. What is rhubarb?

A. The root of a tree growing wild in Turkey, Asia, and Arabia Felix, very valuable in medicinal cases.

Q. What is the rhubarb used for pies?

A. It is a plant that grows wild on the mountains of Rhodope in Thrace, a country north of Greece, and is now cultivated in England; the stalks are used for *pies*.

Q. From what place have we senna?

A. From Alexandria in Egypt; the leaves are dried and used for medicine.

Q. What is peppermint?

A. A plant growing in wet marshy grounds in some parts of England: peppermint water is distilled from it.

Q. What is ipecacuanha?

A. The root of a plant growing in Brazil in South America; very useful in medicinal cases.

Q. Where do aloes grow?

A. In Socotra, an island east of Africa. The juice is pressed from the fresh leaves, and, when dried in the sun, it becomes hard, and is a very valuable medicine.

Q. What colour is produced from aloes?

A. A beautiful violet. The Mahometans and Egyptians consider it sacred, and hang it on their doors when they return from a pilgrimage to Mecca.

Q. Is not the Chinese aloe very useful?

A. Yes, the inner bark when burnt has an agreeable smell, and the branches taste like candied citron.

Q. Of what use is the root?

A. Ropes are made of it. The Indians cover their houses with the leaves; and the fibres are made into thread.

Q. What is quassia?

A. The root of a tree growing in South America. It took its name from the slave who first used it in Surinam to cure fevers. The bark and wood, as well as the root, are all useful in medicine.

Q. Where does saffron grow?

A. In a town near Cambridge, called Saffron Walden. The orange-coloured flowers are dried and made into cakes, useful both for dying, medicine, and often for pastry.

Q. Where do mint and thyme grow?

A. In England; they are very useful herbs, and were brought from Persia.

Q. What is sorril?

A. A wild sour herb, growing in England. Salts of lemon, used for taking ink-stains out of linen, are made from it.

Q. What are camomile flowers?

A. The flowers of a plant, also growing in England, used as a medicine.

Section 3.—*Useful Trees and Fruits, etc.*

Q. What are the names of the principal English trees?

A. The oak, the elm, the fir, the beech, the ash, the poplar, the walnut and chestnut.

Q. What sort of timber is produced from the oak?

A. The most valuable and durable; it is used for building ships, because it will endure longest in water, and for the beams of houses or those parts that require strength. The best oak for ships is in the forest of Dean, Gloucestershire.

Q. Is not every part of the oak valuable?

A. Yes, the bark is used by tanners and dyers, the ashes to purify and cleanse wine, and even the sawdust is of use.

Q. What is made of the root?

A. Handles for knives and hammers, &c.; and the acorns provide food for deer and hogs.

Q. Has the bark any other use?

A. Yes, for medicinal purposes; the *branches* are burned for charcoal.

Q. Does the oak live to a great age?

A. Yes, one was cut down in Wales, which had been growing 400 years.

Q. How is the age discovered?

A. By counting the rings in its trunk; it forms a fresh ring every year.

Q. What tree is next in beauty to the oak?

A. The elm; the wood is used for water-works, mills, pipes, and pumps; also for picture frames, coffins, and carved works.

Q. Of what other use is the elm?

A. The branches are burnt to make charcoal, and cattle are sometimes fed on the leaves; the charcoal is nearly as good as that of the oak.

Q. What is the wood of the fir-tree called?

A. Deal; it is very useful for floors, wainscots, and other common purposes. The best deal comes from Norway.

Q. Of what other use is the fir-tree?

A. Turpentine, pitch, tar, and rosin are obtained from it.

Q. In what way?

A. A hole is cut in the bark during the spring, and the sap or juice which runs out, forms common turpentine. After it is prepared, a thick matter settles at the bottom, called yellow rosin.

Q. Of what use is the tree after this?

A. It is cut down, sawn in pieces, and burnt in a pit. While burning, a black thick matter runs from it, called tar.

Q. What is pitch?

A. Tar boiled with water and sometimes rosin; pitch mixed with rosin and oil makes shoemakers' wax, and when mixed with fat, carriage grease.

Q. Is the ash useful?

A. Yes, the wood is used for handles for spears, for ploughs, harrows, axle-trees, and oars for boats.

Q. Of what use is the beech?

A. The wood is used by turners and cabinet-makers for fancy articles, as it is clean, white, and finely grained, and not apt to bend or slit.

Q. Are not the walnut and chestnut *trees* used for the same purposes?

A. Yes. The wood is better for joiners, being less subject to worms; it is also more beautifully grained and of a browner colour. The wood of the chestnut is very lasting.

Q. Of what use is the poplar?

A. Wooden vessels and soles and heels of shoes are sometimes made of it; the timber is also useful to carpenters.

Q. What other trees are useful for manufacture?

A. The lime, the willow, the box, the holly, the maple, the plane, the cypress and the yew-tree.

Q. Of what use is the lime or linden-tree?

A. The lime has a beautifully scented blossom, very useful to the bees, and the wood is used by carvers, and also to make pill-boxes.

Q. What is made of willow twigs?

A. Baskets, cradles, and all sorts of wicker-work. Osiers are low willow-trees, used for hampers, hurdles, &c.

Q. Of what wood are tops and chess-men made?

A. Of boxwood. The maple, the box,

and the holly are mostly used for fancy articles; violins and musical instruments are often made of maple, because of its lightness.

Q. From what tree is birdlime made?

A. From the bark of the holly. The holly bears a red berry, and is used to ornament our houses at Christmas as a sign of rejoicing.

Q. What ancient people used it for the same purpose?

A. The Romans; they also valued maple wood, and had expensive tables made of it.

Q. Was not the plane-tree much valued by the Greeks and Romans?

A. Yes; it is a noble tree, and with numbers of them they formed avenues to their fine buildings, because of the shade they produced.

Q. What kind of tree is the cypress?

A. A dark green tree, a native of Cyprus, sacred to Pluto, god of hell, because of its gloomy appearance; it is often now, as in ancient times, placed over monuments as a sign of mourning.

Q. By whom was the wood considered very valuable?

A. By the ancients. It is of a pale red colour, with deep veins, and very durable. Pliny, the Roman historian, tells us that the gates of the temple of Diana were made of it, that in his time they were 400 years old, and as good as new.

Q. How does it happen that so many yew-trees are planted in churchyards?

A. The wood of the yew-tree was used to make bows in the time of the Normans, when bows and arrows were used in battle. William the Conqueror, therefore, ordered yew-trees to be planted in every churchyard, to secure that sort of wood for the bows.

Q. Are not many other English trees useful?

A. Yes, the wood of the pear-tree is often used, and many others, as the sycamore, the larch, the aspen, the acacia, the laburnum, &c.; but these, and indeed all trees, are considered ornaments to a landscape, and are seldom cut down unless quite necessary.

Q. Mention some foreign trees useful for manufacture.

A. The teak, the mahogany, the cedar, the ebony, the jacaranda or rosewood, and the bamboo.

Q. What is the teak-tree?

A. It is called the oak of the Eastern world, and is used for ship-building; it is a native of Pegu, and grows on the coast of Malabar, and in all parts of Bengal.

Q. From what tree is mahogany cut?

A. From a species of cedar growing principally in Jamaica, Cuba, and St. Domingo, the West India islands, and in the southern parts of Honduras, and East Florida.

Q. Which is considered the best mahogany?

A. That called Spanish, because those parts of the country in which it grows once belonged to the Spaniards. The wood of one tree has produced 1,000*l.* when made into tables, chairs, &c.

Q. Are there not other cedar trees?

A. Yes, they produce a beautifully *scented wood*. The mountains of Libanus or Lebanon were famous for these trees. Solomon's temple and palace were built of cedar, and lead pencils are made of it.

Q. What is ebony?

A. The inside of a tree growing in Ceylon and the East Indies. The outside wood, which is white and soft, decays, and leaves the black part untouched; this is called ebony; it is used for inlaying and other ornamental work.

Q. What is rosewood?

A. A dark beautiful wood, often used for furniture in preference to mahogany; it grows in Jamaica and the Brazils. The natives of Brazil call it the jacaranda tree.

Q. Is the bamboo a tree?

A. No; an Indian reed full of dark spots, which look like joints. The Indians use them for buildings, articles of furniture, and even water-pipes.

Q. Are these reeds large enough for all these uses?

A. Yes; the stalks sometimes grow to the height of 100 feet; of the small stalks the natives make walking-sticks, and the *people of* Otaheite make flutes of them.

Q. What is sandal-wood?

A. The wood of a tree growing in Siam; it is used for fans, toys, and ornaments, and small pieces are burnt in India on account of its beautiful scent; perfume is also extracted from it.

Q. What use is made of it in China?

A. The Chinese make coffins of it, and perfume their persons and houses with it.

Q. What is satin-wood?

A. The wood of a beautiful tree growing in the Brazils and Jamaica, used for inlaying.

Q. Mention some English fruit-trees.

A. Apples, pears, plums, cherries, peaches, apricots, nectarines, damascenes, mulberries, grapes, medlars, melons, and the various kinds of nuts.

Q. What are the fruits growing on shrubs or small plants?

A. Gooseberries, raspberries, currants and strawberries.

Q. Are any of these trees and plants natives of England?

A. Only the common nut; as acorns, *nuts, and* crab-apples, were the only fruit in the island, when it was conquered by the Romans.

Q. From what country was the apple brought?

A. From Persia. A young shoot of a good apple-tree was ingrafted on a crab stem, which had grown from the pip or seed of a crab-apple.

Q. Will not all fruit-trees grow from the pip of the fruit?

A. Not to produce good fruit; the plant growing from a pip is only wild, and must be ingrafted with good fruit before it will come to perfection.

Q. From what country were pears brought?

A. From Italy. The wood is used for picture frames, tools, and common rulers.

Q. What pleasant drinks are made from apples and pears?

A. Cider from apples, and perry from pears.

Q. From what are plums produced?

A. The greengage, and the magnum bonum or egg plum, are both produced from the wild plum or bullace. Plums were brought to this country from France, and are exported from thence when dried in large quantities; they are then called prunes or French plums.

Q. From whence had we cherries?

A. Cherries grew wild in the woods near Cerasus in Pontus, on the Black Sea; from Cerasus the name is corrupted to cherries. They were taken to Rome by Lucullus, a Roman general.

Q. When were they first planted in England?

A. In the reign of Henry VIII. near Sittingbourn in Kent; this place is still famous for its cherry orchards. The wood of the tree is also very useful.

Q. What country produced the peach?

A. Persia; the nectarine is a kind of peach. Apricots and quinces came from Epirus, Carthage, and Asia Minor.

Q. Where is Epirus?

A. In Greece. Carthage was a city in Africa, founded by Queen Dido; Tunis now stands on its ruins.

Q. What is the word apricot derived *from?*

A. From the Latin word *apricus*, which signifies sunny. The apricot is supposed to be a native of Africa.

Q. What are medlars?

A. A native English fruit found growing wild about a hundred years ago. They are kept in bran for a fortnight, and sent to table half rotten.

Q. From what country were melons brought?

A. From some of the islands of the Levant; it is a sort of cucumber eaten when ripe, and is raised under glass in this country, but is not so perfect as those that grow in hot climates.

Q. What are water-melons?

A. Another species, which melts in the mouth, and is valuable in hot countries for its coolness; the pulp is generally of a red colour.

Q. Is the cucumber a fruit?

A. Yes; it is eaten before it is ripe with pepper, salt, and vinegar. The young cucumbers are called gherkins, and are pickled.

Q. Are nuts natives of England?

A. Only the common nut. Philibert, King of France, caused this nut to be improved, and it was called Filbert from his name. Chestnuts come from France and Spain.

Q. What is the difference between this chestnut and the horse chestnut-tree?

A. The leaves of the Spanish chestnut are long and pointed, with notches at the edges. The horse chestnut is also enclosed in a prickly shell.

Q. When was the first gooseberry-bush planted in England?

A. In the reign of Henry the Eighth it was brought from Flanders.

Q. Do not several berries form delicious fruit?

A. Yes, strawberries and raspberries are supposed to be the common blackberry in a highly cultivated state; cranberries, elderberries, whortleberries, grow wild, and are very useful.

Q. Where was the first mulberry-tree planted?

A. *At Sion* House, the seat of the

Duke of Northumberland. The Morea in Greece is famous for mulberry-trees, and takes its name from *morus*, a mulberry-tree.

Q. What are the different kinds of grapes?

A. Red and white grapes, raisins or dried grapes, and currants or Corinthian grapes.

Q. Is the black, white, and red currant a species of small grape?

A. Yes; the first tree was brought from the island of Zante, and planted in England in the reign of Henry the Eighth. They were called Corinthian grapes, and the word corinthian was in time corrupted to currants.

Q. Is Corinth now famous for these grapes?

A. No. The dried currants used for puddings, &c., are prepared in Zante, and exported to other countries in great quantities. The Turks would not allow vessels to sail to the Morea to take the currants; their cultivation was therefore neglected.

Q. What country produces the finest grapes for table?

A. England, by artificial heat in houses; a bunch of grapes weig 19½ lbs. was produced in the viner the Duke of Portland.

Q. Where are the finest vineyards

A. Between Rome and Naples; the trained from the branches of elms poplars.

Q. Are many foreign fruits prod in hot-houses?

A. Yes, with great care and atten oranges, pine-apples, figs, and se others may be produced, but they are so fine as those brought from their na country.

Q. Where do oranges grow?

A. In the islands of, and places the Mediterranean, also in China. perfume called Bergamot is made f the rind of the orange.

Q. What are Seville oranges?

A. They are large, have a dark ro skin, and are very bitter, but usefu medicine and cookery; they grow Seville, a town of Spain.

Q. What is the shaddock?

.. A kind of orange sometimes as large
child's head; it takes its name from
tain Shaddock, who took it from China
planted it in the West Indies, where
ow grows as well as in India.

. From whence are lemons brought?

. From Spain and Portugal. The le-
-tree is a native of Asia Minor. The
on is useful in medicine and cooking,
the juice will take out iron-moulds.

. What are the citron and lime?

.. Both species of lemons, but the citron
arger, and the lime smaller than the
on. The lime grows in North Ame-
and the West Indies.

. Where do the finest figs come from?

.. From Spain; they are dried and
ked in boxes in the shape of a
m. The wood of the fig-tree is much
ed; in Eastern countries coffins are
le of it.

. Where are pine-apples plentiful?

.. In Sierra Leone in Africa, but they
brought to England now in great
ntities by steam from North America
the West Indies.

Q. Mention some other foreign fruits.

A. Almonds, cocoa-nuts, Spanish and Brazil nuts, dates, guavas, mangoes, nutmegs, olives, allspice, pomegranates, and tamarinds.

Q. What are nutmegs?

A. The kernel of a fruit growing in the East Indies. It has four covers, the first like our walnut, thick and soft; the second, a thin reddish coat, with an aromatic smell and taste.

Q. What is this red shell called?

A. Mace, it is useful in cookery; the shell under the mace is hard and black, and under this is a thin green skin of no use, which encloses the nutmeg.

Q. From whence have we almonds?

A. From Spain, France, and Italy; they are enclosed in a tender shell, and the fruit yields a great deal of oil when pressed. The oil of the bitter almond is poisonous.

Q. What are cocoa-nuts?

A. A fruit growing in most hot climates. The tree grows to a great height, and has *leaves only at* the top; the fruit hangs in clusters like grapes, twelve or fourteen together.

Q. Has the cocoa-nut more than one shell?

A. Yes; it is enclosed in a rough fibrous shell, sometimes as large as a child's head, but egg-shaped. The inner shell is round, and contains milk; when fresh, it is a delicious fruit.

Q. What use is made of the shells by the natives?

A. Of the outer one sails, cloth, and cordage are made; from the inner shell, ornaments, cups, spoons, &c.; and from the trunk of the tree they make their boats.

Q. Where do the small nuts grow which are eaten at table?

A. In Spain; they are called Spanish nuts, and are about the size of our wild nut. Brazil nuts are long, brown, and flat at the sides; they come from Brazil in South America.

Q. Where does the date-tree principally grow?

A. On the African coast of the Mediterranean; it is also called the palm-tree, and the leaves, which grow at the *top*, are sometimes eight or nine feet long.

Q. What is the shape of the fruit?

A. Something like a large acorn, but sometimes they are larger, and round like apples. There are also black, white, and brown dates.

Q. What are guavas?

A. A wholesome West Indian fruit; it is sometimes eaten raw, but generally as a sweetmeat or jelly.

Q. Where do mangoes grow?

A. In the East Indies. Those we see in this country are pickled, or, while unripe, preserved. When ripe, the fruit is the size of the egg of a goose, and the smell is so refreshing that it is supposed to restore people to health.

Q. What are bananas?

A. The fruit of the plantain-tree cultivated in the East Indies. It grows to fifteen or twenty feet high, the leaves are sometimes eight feet long, and grow in clusters at the top like the palm and cocoa-nut trees.

Q. Of what shape is the fruit?

A. That of the cucumber. The bunches in which it grows sometimes weigh above forty pounds. The negroes make it their chief food.

Q. Where do olives grow?

A. In Italy, Spain, and the South of France. They are pickled, but not considered wholesome for delicate persons, on account of the oil they contain.

Q. Is this oil useful?

A. Yes, it is called sweet oil, or oil of olives, and is used in salad and many other things.

Q. What are tamarinds?

A. The pulp of a fruit growing in India, by some people called the Indian date. The tree is like our ash-tree, and the fruit grows in a pod. Tamarinds are useful as a medicine and as a preserve.

Q. Where do pomegranates grow?

A. They are natives of Granada in Spain. The fruit, which is like an apple, but with a thick brownish rind, grows on a shrub like the myrtle. The blossoms are purple.

Q. What is allspice?

A. The fruit of a beautiful tree growing in Jamaica, called the pimento. It is called allspice because it is supposed to taste like all other spices; we use it ground into powder.

Q. What is the betel-nut?

A. The nut of a kind of palm-tree, growing in India. The natives eat so much of it that their teeth are dyed quite black, which is considered a great beauty. They also carry it about like snuff.

Q. Where does the bread-fruit-tree grow wild?

A. In Otaheite; it is the size of our apple-tree, and the fruit is as large as a penny loaf, and has a thick tough rind.

Q. Is it eaten raw?

A. No. It is gathered when green, then roasted or baked, and the inside becomes soft and white like the crumb of new bread.

Q. Where is the butter-tree found?

A. In Bambarra, in the centre of Africa. It yields a kind of fruit like vegetable marrow; from this fruit oil is extracted by boiling, and when cool, he oil is made into cakes and used as utter.

Q. Besides the bread and butter trees, s there not a tree called the cow-tree?

A. Yes. It grows in America; the ranches appear dead, but when the runk is pierced, it yields sweet milk.

Q. What other parts of trees are useful esides the trunk and the fruit?

A. The bark, the leaves, the flowers, the ith, and the gum found on many trees, re all useful.

Q. Of what tree is cinnamon the bark?

A. Of a tree growing in the island of eylon; it is the under bark of the branches. The leaves, fruit, and root yield oil, of which candles were made for he king, on account of their fragrant smell while burning. Cinnamon is used as a spice and medicinally.

Q. From what is sago prepared?

A. From the pith of the landan tree, a tree something like palm, growing in the Moluccas.

Q. What is cork?

A. The bark of a beautiful tree like

the oak, growing in Spain; it is soaked and dried for use. The Egyptians made coffins of cork.

Q. What is Peruvian bark?

A. The bark of the quinquina-tree growing in Peru, very useful in medicine. The Jesuits discovered it, and it is often called Jesuits' bark.

Q. What is India-rubber?

A. The gum or juice of the syringa-tree, growing in Guinea, Quito, and Cayenne. As the gum flows it is taken and dried, or made into boots, bottles, cloth, and many useful things.

Q. What is the black varnish used in Japan and China?

A. The gum of the Cashew-nut-tree; whatever it touches is stained a deep black. Our japanned articles are imitations of this.

Q. Why are they called japanned?

A. Because the first beautiful things varnished in this way were brought from Japan.

Q. What is gum arabic?

A. The gum of a tree growing in

Egypt, Turkey, and places near the Persian Gulf. It is used by dyers and water-colour manufacturers.

Q. What is pounce?

A. The gum of the juniper-tree dried and pounded. It is used to throw over writing to dry the ink quickly.

Q. Of what use are juniper berries?

A. Gin is partly made from them. The juniper-tree grows in Holland.

Q. What is manna?

A. A gum flowing from a kind of ash-tree growing in Italy and Sicily, very useful as a medicine.

Q. Is not myrrh also a gum?

A. Yes. It flows from a kind of tree like the acacia; frankincense is also another gum, which when burnt has a very fragrant smell.

Q. Is there a tree called the tallow-tree?

A. Yes. The kernel of the fruit is melted by the Chinese to make candles; they add a little oil, and colour it with vermilion: it is better than tallow, but not so *good* as wax.

Q. What is opium?

A. The juice of the white poppy; it is used as a medicine, but when too much is taken, is a deadly poison.

Q. Is not gutta percha a gum?

A. Yes; it is the gum of the Niato tree; its great use has been only lately discovered; when placed in hot water it becomes soft, and can be made into any shape.

Q. Does the shape remain?

A. Yes; when dry and cold it becomes hard, and can be melted and mixed with colour to make ornamented articles.

Q. What is camphor?

A. The gum of a kind of bay or laurel-tree, growing in China; very useful in medicinal cases.

Q. What is otto of roses?

A. It is made from roses. Herat, in Persia, is noted for this beautiful perfume. Roses were first brought to England from Persia.

Q. What is benzoin?

A. A thick white gum, which oozes

from a tree growing in the island of Sumatra; it is very useful in making friars' balsam and for healing cuts.

Q. Is it not used to make court plaster?

A. Yes; isinglass is dissolved and spread over black sarsenet, and this is afterwards washed over with benzoin and spirits of wine.

Q. What is gum guaiacum?

A. The gum of a tree growing in the West Indies; the bark and flowers are also used as medicine, and the wood is very valuable. The tree is call lignum vitæ.

Q. What is copal?

A. The gum of a tree growing in New Spain; mixed with spirits of turpentine, it makes a transparent varnish.

Q. What is balm of Gilead?

A. The dried juice of a small shrub growing in Abyssinia and Syria; only sixty drops can be procured from one tree daily. Balm of Gilead was one of the presents sent by the Queen of Sheba to King Solomon.

Q. What is assafœtida?

A. The gum of a plant like our cauliflower, growing mostly on the mountains of Persia. The smell and taste are most nauseous; it is a very valuable medicine.

CHAPTER IV.

ANIMALS, BIRDS, INSECTS, ETC., USED FOR MANUFACTURES AND FOOD, ETC.

Section 1.—*Quadrupeds.*

Q. WHICH are the most useful quadrupeds?

A. Horses, oxen, and sheep. Horses, besides being beasts of burden, are useful when dead.

Q. In what way?

A. The hair of the mane is used for stuffing mattresses, chair-seats, and saddles, and the hair of the tail is woven into cloth for covering chairs and sofas; fishing lines, sieves, and bows for violins, &c. are made from it.

Q. Is the skin useful?

A. Yes; it is used to make collars, traces, and other parts of harness. The horse is a native of Arabia.

Q. Of what use is the cow while living?

A. While living, the cow provides us with milk, from which we have cream, and from cream we make butter and cheese. The ox provides us with food when dead.

Q. Of what other use is the ox?

A. Of the skin leather is made; and the horns are made into spoons, cups, handles for knives, and also used instead of glass for lanterns. The hair is mixed with lime to make mortar.

Q. Is oil made from any part of the ox?

A. Yes; from the feet, called neat's foot oil. The refuse of their fat is also made into tallow for candles.

Q. What is rennet?

A. The stomach of a young calf cleaned and salted; it is used to curdle milk for making cheese; curds and whey are also made with rennet. Vellum is made of the skins of calves.

Q. What is the buffalo?

A. A kind of wild ox. Butter made from the milk of the buffalo, is called by the Indians, ghee.

Q. How is cheese made in Lombardy?

A. From a mixture of ewes' and goats' milk with that of the cow. It has a very rich flavour, from the pasture on which the animals feed; and is called Parmesan cheese.

Q. What is parchment?

A. The skin of sheep and goats. Sheep are most useful animals; their wool, which is cut off twice a-year, is spun, woven, and dyed to make cloth for coats; flannel and stockings for winter. When dead, their flesh is called mutton.

Q. Is the flesh of the goat eaten for food?

A. Not in England, but the hair is

very useful; wigs are made of it, and when mixed with wool it makes a kind of cloth called felt, of which hats are made.

Q. Is not the fur of the rabbit and hare used in the same manner?

A. Yes; the skin of goats is also used to make leather, called morocco leather, because it was invented by the people of Morocco in Africa.

Q. Is not morocco leather coloured?

A. Yes; and the skin of the goat is used because from its softness it takes the dye better, and the colours are more brilliant. morocco leather is now beautifully made in London.

Q. What is a young goat called?

A. A kid; gloves and sometimes shoes are made of the skin of the kid, and also of lamb and doe skin. The doe is the female deer.

Q. Are the horns of the deer useful?

A. Yes; in ancient times hartshorn was made only from them; but it is now also distilled from bones. The flesh of deer is called venison. Breeches are made of buck and doe skin.

Q. Of what use are swine?

A. Their flesh supplies us wi
ham, and bacon; from the re
the fat lard is made. Their ski
leather for saddles and bridles.

Q. Is dog's skin useful?

A. Yes; shoes are made of it
shoes are partly made of calves' s

Q. Is the ass useful?

A. Besides its patience and
in working, the milk of the
considered very wholesome f
persons; leather is also made
skin.

Q. Mention the names of some
quadrupeds whose skins are usef

A. The merino sheep, the ango
the elk, the bear, the badger, t
the wild cat, the lynx, the ti
leopard, and the wild fox.

Q. Of what country is the meri
a native?

A. Of Spain. The angora g
native of Thibet. Cashmere and
are the wool of goats found in the
parts of India. The wool of the

is spun into very fine cloth for dresses, shawls, &c.

Q. What is the elk?

A. A kind of deer as large as a horse; gloves are made of its skin; it inhabits Europe, Asia, and America.

Q. Of what countries is the bear a native?

A. Of most northern countries. The fur is useful for hammer-cloths for carriages, caps, and gloves, and to line winter cloaks. Muffs, &c. are seldom now made of this fur; bear skins are black and brown, except in Greenland, where the bears are white.

Q. What is the badger?

A. A small kind of bear; the skin is used for soldiers' knapsacks and for travelling trunks, the hair or bristles are made into brushes for painters, and are used by shoemakers instead of needles.

Q. Of what are the brushes used by artists made?

A. Of camel's hair fixed in quills. The hair of the camel falls off, and grows again every year.

Q. Of what are the beautiful Indian shawls made?

A. Of camel's hair; and imitations of it, made from undressed wool, are now used for ladies' cloaks and trimmings.

Q. Is the skin of the wolf useful?

A. Yes; it makes a warm and durable fur. Wolves were once very numerous in England, but were destroyed by order of King Edgar, and Edward the First.

Q. What is the colour of the hair of the wild cat?

A. A fine whitish grey. This cat is very savage, and inhabits the woods of Asia, America, and some parts of Europe.

Q. What cat's skin is most valuable?

A. The skin of the Spanish cat. The Russians also export a great number of cat's furs, even into China.

Q. What is the lynx?

A. A creature of the cat tribe, about four times as large, with a soft thick spotted fur.

Q. What animals provide us with fur for muffs, boas, victorines, and other fur *trimmings?*

.. The best furs are from the sable, the ine, the chinchella, the Siberian squir- the polecat, and sometimes the bear.

. What is the sable?

.. An animal about the size of a large ; found in the northern parts of Asia America. The fur is a dark brown 1 black edges. It is very expensive.

. What is the ermine?

.. A little creature about the same as the sable, found in Siberia, Russia, way, and Lapland. The ermine is ow in summer and white in winter, 1 a black tail.

. Is the whiteness in winter of use to ermine?

.. Yes, because they live in countries stantly covered with snow, and being the same colour they are thus con- ed from their enemies.

. What is the colour of the fur of the erian squirrel?

.. A kind of grey. There are red, te, and black squirrels in other ntries, but the skin of the grey or *erian squirrel* is most valuable.

Q. What is the chinchella?

A. A small creature of the rat tribe. The fur is a mixture of grey and white, and beautifully soft. It is found in South America. The Peruvians used to spin the hair into wool.

Q. What is the fur of the polecat called?

A. Fitch. It is said to breed moths, and is now seldom used for dress. Polecats are natives of Germany and Poland.

Q. Have not many other skins been dyed to make imitations of these valuable furs?

A. Yes, the skins of the squirrel, hare, rabbit, and cat, are often dyed to represent sable.

Q. Are the skins of wild beasts ever used?

A. Yes, the skins of the tiger and leopard are used to place under saddles on war horses, also for hammer-cloths, and hearth-rugs. The Chinese value tiger skins very highly.

Q. What are seals?

.. Amphibious animals, generally
ıd in rocks and caverns near the
ar Seas. Their skin is very useful
covering trunks, making caps, &c.

ı. What are elephants' tusks?

.. Ivory. The best is from Siam in
south of Asia; the whitest and
othest from Ceylon, as it never turns
ow.

ı. Of what use is ivory?

.. Many useful things, such as handles
knives and piano keys are made of
as well as boxes, fans, and other
amental articles.

ı. Is ivory valuable?

.. Yes, the Indians and Chinese can
ke from a piece of ivory weighing
ut 3 oz., a beautiful toy worth 100
ars, or nearly 25*l*.

ı. What is ivory-black?

.. Ivory or bones burnt black, and
rwards ground to powder. It is used
painters and jewellers.

ı. What is often used for common pur-
es instead of ivory?

. *Bone. The* bones of animals may be

scraped and polished to make handles, and many other useful things; the shavings of bones are also useful.

Q. Is the skin of the rhinoceros thick?

A. Yes; it is sometimes an inch thick, and so hard and pliant, that walking-sticks and riding-whips are made of it; and when scraped and polished they appear like transparent amber.

Q. Is the skin of the wild boar useful?

A. Very seldom, as it is thick and coarse; but the flesh, when pickled, is called brawn; and the hams brought from Westphalia, in Germany, have a very peculiar flavour, being smoked in chimneys where wood only is burnt.

Q. What is the marten?

A. A small animal found in Hudson's Bay; the fur is much admired by the Turks. It is of a dark colour.

Q. What is shagreen?

A. The skin of the wild ass, useful from its hardness for many things,—covers of books, cases, leaves for pocket-books, &c., are made of it.

Q. *What* is musk?

.. A perfume, found in a bag, under stomach of a wild animal like a deer nout horns, found in Thibet, Tonquin, eria, and Bantam. Musk is also used nedicine.

ı. Where are the chamois hunted?

. Among the Alps and Pyrenees; y are a kind of antelope, and their skin varm, pliable, and very useful.

ı. What kind of animal is the beaver?

. An amphibious animal about the of a rabbit, of a brown colour, and ative of Canada and other parts of th America; beaver hats are made of hair.

ı. For what is it remarkable?

. For its wonderful instinct, and for curious manner in which it contrives habitation.

ı. Are the sinews of animals useful?

. Yes; when boiled down they make e. A kind of glue, called size, is also de from the parings of sheep-skins and edges of parchment.

ı. Of what are the strings of harps and ins *made?*

A. Of the entrails of sheep and lambs twisted; it is called cat-gut.

Q. What is sponge?

A. A marine substance found sticking to rocks and shells; it is supposed to be formed by some animal as its habitation.

Section 2.—Birds.

Q. Which birds are called domestic fowl in England?

A. Turkeys, geese, ducks, and chickens. They are all eaten for food.

Q. Of what other use is the goose?

A. The small feathers of the goose are used for stuffing beds, the wing feathers for pens, and the soft feathers on the breast are called down. Chickens' and ducks' feathers are also used for filling beds.

Q. Is not the swan a domestic bird?

A. Yes, but the swan is now not eaten, it is kept for ornament, as also the peacock. Cygnets, or young swans, are sometimes fattened for the table.

Q. *What* is swan's-down?

A. The skin of the wild swan dressed
h the down on it, and made into muffs
l boas for ladies.

Q. Are not the young pea-fowl con-
ered great delicacies?

A. Yes; and among the Romans the
cock was highly esteemed as a va-
ble dish. The Chinese decorate the
s of their mandarins, and their orna-
ntal works, with peacocks' feathers.

Q. What are wild birds generally called
en used for food?

A. Game, such as pheasants, partridges,
l pigeons, &c.

Q. Is the plumage of foreign birds
re beautiful?

A. The colours are generally brighter
gayer. The most beautiful is that
the Bird of Paradise, found in New
inea, and sometimes worn by English
es in their bonnets.

Q. What are those large feathers some-
es worn by ladies?

A. The feathers of the ostrich, a large
ican bird. The eggs of the ostrich are
h *esteemed; they* are so large that

one will weigh fifteen pounds, and is enough for eight men.

Q. Have the feathers of birds been generally used for ornaments?

A. Yes; and among savage nations the chief is generally known by wearing the feathers of some particular bird.

Q. What is eider-down?

A. The beautiful down of the Eider duck. These birds strip the down from their breasts to line their nests, and it is stolen from them by the natives.

Q. Where are they found?

A. In the northern parts of Europe, Asia, and America. Cushions and pillows are made of the down, and beds of it are used instead of quilts in very cold countries.

Section 3.—*Insects.*

Q. Can any insects be useful to man?

A. Yes; our own little insect, the bee, provides us with honey and wax.

Q. What refreshing drink is made from *honey?*

A. Mead and metheglin. The cells in the bee-hive, which contain the honey, are of wax, and are called the honey-comb.

Q. Of what use is wax?

A. It is of use for wax-candles, to form moulds and many other things; the bee's-wax is yellow, like honey, but is made white by melting in water and bleaching in the sun.

Q. Of what is sealing-wax made?

A. Of gum lacca, melted and prepared with resin, and coloured red with ground cinnabar, vermilion, or according to fancy.

Q. What is gum lacca?

A. It is a kind of gum or wax made by a species of ant found on the coasts of Malabar, Bengal, and Pegu.

Q. What is the colour of this gum?

A. A bright red; it is formed in cells like the honey-comb, in which, when broken, the young insects are found; they are of a bright red colour.

Q. What are gall nuts?

A. A kind of ball formed by a fly of

the Ichneumon kind, on trees, to contai its eggs and hatch the young ones; it larger, and more frequently seen, on tl oak.

Q. Are the gall nuts used for dyein &c. produced in England?

A. No; it is from Aleppo, in Asiat Turkey, that the most useful gall nu are exported in great quantities; tl black and green are used to dye blacl and also in making ink.

Q. What are cantharides?

A. Spanish flies, or beetles, used f raising blisters. They are produced fro a little worm hatched on wheat, and a all of a green or golden hue. They a destroyed by the fumes of boiling vinega and afterwards dried.

Q. What is cochineal?

A. A dye produced from an insect the same name, found in the fruit of tree growing in Mexico and the Spanis West Indies.

Q. Do these little red insects alon produce this beautiful scarlet?

A. No; they are prepared with a sol

tion of tin. These insects are not larger than a pea.

Q. What is the hornet?

A. A creature like a grasshopper, but much larger; they are much esteemed by the Hottentots, who boil them in milk, and make their eggs into a kind of soup.

Q. What is coral?

A. A beautiful substance formed by small creatures, called polypes, into large rocks. The real, or red coral, is found in the Red Sea and the coast of the Mediterranean. The white is found on the shores of Ceylon.

Q. Which is the most useful insect for clothing?

A. The silkworm. Velvet, satin, and silk, are made of the web. It is a native of Serica, a country of Asia, generally supposed to be China.

Q. What changes does the silkworm undergo?

A. From a little black egg, of the size of a pin's head, a worm is hatched; and after feeding on mulberry-leaves for about six *weeks, it* becomes a large yellowish *worm or cat*erpillar.

Q. What happens to it then?

A. It winds itself up in a bag of si from which, if the silk were not wou off in a month, it would work its way c and appear as a beautiful moth with fc wings.

Q. What is the bag of silk called?

A. A cocoon; when wound off at t end of a fortnight a grub, or chrysa is found within, which remains anoth fortnight before it becomes a butt fly.

Q. Does the silkworm eat after it b gins to spin?

A. No; and the butterfly, after layi about two hundred eggs, dies in a wee

Q. What are leeches?

A. Black worm-like animals, found muddy waters in several English rive useful in surgery for drawing blood.

Q. How are they caught?

A. In many ways, but the best is throwing bundles of weeds into the wat and when drawn out the leeches will found sticking to them. These creatu *have three* little sharp teeth with wh *they bite.*

Section 4.—*Fishes.*

Q. Which are the most useful fish for manufactures, &c.?

A. The whale, the tortoise, the sturgeon, and the oyster; but almost all fish are good for food.

Q. Where is the whale found?

A. Principally near the shores of Greenand. The small bones of the roof of the mouth are useful for many things, and are called whalebone. There are about four or five hundred pieces in one whale, each measuring three or four yards long.

Q. What is done with the fat of whales?

A. It is melted, and called train-oil; the natives call it blubber; it is twelve inches beneath the skin, and is used for lamps and for cleansing wool, &c.

Q. What is spermacetti?

A. An oil prepared from the Cachelot whale, of great use in medicinal cases; candles are also made of it. The Cachelot whale is known by having a hunch on *its back.*

Q. What kind of creature is the tortoise?

A. There are two kinds, the land and sea tortoise. It is a sea tortoise, called a caret, that furnishes the beautiful shell so useful in England.

Q. Where is it found?

A. In the islands of the Indian Ocean. They are said to be so large on the coast of Brazil that the natives make boats of the shell. Combs, boxes, and other things, are made of tortoise-shell in England.

Q. What is a turtle?

A. A kind of tortoise found in most countries within the torrid zone, very valuable for making soup.

Q. What is caviar?

A. A kind of food eaten by the Russians and Italians, made from the roes of the sturgeon, a large fish, sometimes twenty feet long. The greatest sturgeon fishery is at the mouth of the Wolga.

Q. What other useful article is procured from the sturgeon?

A. *Isinglass.* The bladder and membranous parts are boiled in water to a thick jelly, and then dried and rolled up to the form we see it in shops.

Q. What is valuable in the oyster besides the food it provides for us?

A. The oyster found in the Persian Gulf and Ceylon produces pearls, which are a disease, in consequence of some injury to the shell. These oysters lie at the bottom of the sea, and can only be obtained by diving.

Q. How are the pearls separated from the oysters?

A. By placing them in heaps of sand, which causes the fish to decay, and the pearls to separate from the decayed flesh.

Q. How many will one oyster contain?

A. Generally about twelve or fourteen, but it is said that one oyster has produced one hundred pearls.

Q. What is mother-of-pearl?

A. The inside shell of another fish of the oyster kind; it is pure and white, and used for inlaying workboxes, &c.

Q. Are these oysters larger than those we *have in England?*

A. Yes, the pearl oyster is four times as large; and the flesh is equally good when pearls are found in it as without pearls.

Q. What are anchovies?

A. Small fish found in the Mediterranean, about the size of a sprat, much used for sauce, and also pickled.

Q. What is the nautilus?

A. A little fish whose shell is like a boat with the sails up; in fine weather it sails on the water, and it is supposed to have given mankind the first idea of a sailing vessel.

Q. What is the murex, or purple fish?

A. A kind of shell-fish, from which it is supposed the Egyptians obtained the rich purple dye so much valued by the ancients.

Q. What is the cuttle-fish?

A. A fish which is furnished with a kind of vessel containing a dark inky fluid, of which it is supposed the Chinese partly make Indian ink.

CHAPTER V.

GEOLOGY, MINERALOGY, CHEMISTRY, ETC.

Section 1.

Q. WHAT is meant by Geology?

A. A knowledge of the structure, composition, and arrangement of the materials of which the earth is formed.

Q. From what is the word Geology derived?

A. From two Greek words: *ge*, the earth, and *logos*, a word or discourse.

Q. How may Geology be divided?

A. Into four divisions.

Q. What is the first division of Geology?

A. A knowledge of the materials which form rocks, mountains, and strata.

Q. What are the strata?

A. The different beds of earth which lie one under the other below the surface.

Q. What is included under the second division?

A. The direction, formation, and extent of the mineral dykes and metallic veins which pass through the earth.

Q. What is the third division?

A. It includes the changes which occur on the surface of the earth by inundations, earthquakes, and volcanoes.

Q. What may the fourth division be termed?

A. A kind of speculative geology, or an inquiry into the causes which may have formed mountains, or caused other changes on the earth's surface.

Q. Of what are rocks and mountains principally composed?

A. They have been divided by Geologists into classes: 1. Primary rocks; 2. Intermediate rocks; 3. Secondary rocks; 4. Alluvial ground; 5. Volcanic products.

Q. What is meant by primary rocks?

A. Primary rocks are supposed to have been formed before the creation of vegetables and animals; they are extremely hard, and their substances are pure *crystallized* matter.

Q. What are intermediate rocks?

A. They consist partly of crystallized matter, and contain numerous remains of animals and vegetables in a fossil state. They separate the primary and secondary rocks, and partake of the nature of each.

Q. Do not these rocks contain metallic ores?

A. Yes; and also sandstone, coal, limestone, chalk, &c.

Q. What is alluvial ground?

A. Land formed from the ruins of other rocks by the influence of water; it consists of gravel, clay, &c.

Q. What are volcanic products?

A. Substances thrown up from volcanoes, or formed by subterranean fires.

Q. What number of primary rocks are observed in nature?

A. Eight. Among these are included granite, porphyry, and granular marble.

Q. Of what use is granite?

A. It is used for paving carriage-roads, on account of its hardness and durability. Waterloo and London Bridges are built of granite.

Q. Is it found in England?

A. Yes, in Cornwall; and forms the summit of some of the highest mountains in the world.

Q. Where are the principal quarries for porphyry?

A. In Egypt; it is the hardest granite, and of a red colour; it has been used for statues and columns, as it will bear as high a polish as marble, but on account of its hardness, the work is expensive.

Q. What is granular marble?

A. All kinds of marble may be included under this term; there are about twenty different sorts, as very few countries produce the same.

Q. Which are considered the most beautiful?

A. The Parian marble, found in the island of Paros, in the Grecian Archipelago; it is beautifully white, and most of the ancient Grecian statues were made of it.

Q. What European countries are famous for marble?

A. Italy, Spain, France, and Great

ain. The white-grained marble with
r and blue stains is brought from
rara in Italy.

. How is white marble generally
ed?

. It is veined with blue, red, green,
ow, violet, according to the country
hich it is found.

. Where is black marble found?

. It is found in some quarries of
nce and Italy. African marble is
erally of a reddish-brown streaked
ı white, or of carnation with veins of
n. In many places in Europe marble
f a pale red, yellow, and black, with
s of other colours.

.. Where is the best English quarry
marble?

. In Derbyshire. There are also beau-
l marbles found in Devonshire, West-
eland, and many parts of Scotland.

.. What is alabaster?

. A kind of limestone, sometimes
posed to be fine transparent marble,
it is of more close texture, and be-
gs to the secondary rocks.

Q. How many divisions may be sai to belong to secondary rocks?

A. Twelve: of these limestone, bitı men or common coal, rock-salt, gypsun and chalk, are most used.

Q. Of what colours are limestones?

A. Black, white, red, and yellow. Lim stone is burnt in a kiln to make lime f mortar. Lime-water is also used as medicine.

Q. Where is alabaster found in th country?

A. In most caverns: those of Derb shire in England, and of Antiparos Greece, are the most celebrated.

Q. Is not gypsum another kind alabaster?

A. Yes; also found in Derbyshire a Cheshire; but the best is from Italy a Spain.

Q. For what was it used by t ancients?

A. For windows; the light pass through it without the alabaster bei transparent.

Q. For what is alabaster used in Pari

A. To make plaster-of-paris, the alabaster is burnt to a powder and mixed with water. The images carried by Italians are made of this preparation.

Q. Is the common coal found in England?

A. Yes, England is the country most noted for coals; great quantities are exported to other nations. It is principally found near Newcastle-upon-Tyne, Sunderland and Whitehaven.

Q. Where is cannal-coal found?

A. In Lancashire. It gives a brilliant light, and affords the best gas. This coal can be polished, to form vases and other ornaments.

Q. Of what is the pavement of Lichfield Cathedral formed?

A. Of pieces of cannal-coal and alabaster, to appear like the squares of a chessboard.

Q. What is coke?

A. Sea-coal partly burnt. Mostly used where a great heat is required.

Q. Where is rock-salt found?

A. *Chiefly* in Poland, Hungary, and

Catalonia. Sea-salt is most likely produced by the quarries of rock-salt having been penetrated by sea-water, which carried away the saline particles with it.

Q. Is salt from rock and sea-water used with food?

A. In some countries; but in England it is drawn from briny springs and wells. The best are in Cheshire, Worcestershire, Hampshire, Northumberland, and some other countries of Europe.

Q. Are there any remarkable mines of rock-salt?

A. Yes; the Polish Mines are wonderful both in size and depth. At the mine of Cracow, there is a kind of town under the earth; the miners live there entirely, and horses taken down never return. Many persons have been born in these mines, and have remained there till death.

Q. In what form is the rock-salt found?

A. Hanging like icicles from the roof and sides of the mines. Travellers when they enter are astonished at the glittering appearance of the salt, which has *been cut* into columns, arches, and even chapels; and these being lighted with flambeaux, sparkle as if they were covered with thousands of precious stones.

Q. What is chalk?

A. It is a kind of earth, forming part of the composition of secondary rocks; it is usually full of the remains of marine animals, and contains layers of flint.

Q. What is done with flints?

A. They are sometimes used for houses and walls, and are broken to pieces to make roads; when burnt into powder they are mixed with clay to make china and glass.

Q. Is slate useful?

A. Yes, as it can be cut into thin plates for covering houses. Writing slates and slate-pencils are also made of this stone, when found solid and dark-coloured.

Q. Is not china made of a kind of stone?

A. Yes, called porcelain; it is something of a flinty nature, and is mixed with clay, baked, and painted.

Q. Why is it called porcelain?

A. From the Portuguese word for as those people were the first who tr to China for it, and the first things brought were cups.

Q. From whence is Portland stone

A. From some rocks named the of Portland in Dorsetshire. It is c free-stone because it will not split, a therefore a fine stone for building.

Q. Which of the buildings of Lo are built of free-stone?

A. Most of the bridges, St. P Cathedral, the Monument, Whit &c. It was introduced into genera by Sir Christopher Wren, after the of London.

Q. Of what use is chalk?

A. It is used for manure; a chalky soil promotes the growth of and fattens cattle. It is also used medicine.

Q. Is not putty made from chalk

A. Yes; whitening is pounded c which, when mixed with oil and w lead, forms putty.

Q. *By whom* is black chalk used?

A. By artists. It is found in France, Spain, and Italy. From the latter place we have the best Italian chalk.

Q. What is the foundation of all other rocks?

A. Granite; and from its great depth it is seldom met with. Countries covered with secondary rocks can generally be cultivated over the whole surface.

Q. Of what are soils composed?

A. Of various kinds of earth, produced by the influence of air and water, on all kinds of rocks lying near the surface.

Q. Is anything useful in a decayed state?

A. Yes; rich soils are produced by the remains of animals and vegetables in a state of decomposition. Secondary rocks also contain great quantities of these in their formation; but from the absence of air and the influence of saline particles to act upon them, they are sometimes found in a state of petrifaction.

Q. What is petrifaction?

A. *Changing* to rock or stone. The

organic remains of animals in a perfect form have been dug out of rocks, and are preserved in museums; they are called fossil remains.

Q. Are there any places in England which produce petrifactions?

A. Yes; the caverns of Derbyshire and Westmoreland. They contain water strongly impregnated or filled with mineral juices, and which, as it drops, not only becomes stone itself, but petrifies every thing upon which it falls.

Q. Of what are volcanic rocks formed?

A. Of lava, pumice stone, and other things, which have been thrown up by the fires of a volcano; the soil produced by these particles is so rich, that although whole cities have been buried by the burning lava, yet after a few years another is found near its ruins.

Q. What city is near the foot of Mount Vesuvius?

A. Naples. Many curious things are made by the Italians of the lava; and pumice-stone is used for smoothing the *surface* of wood, leather, metals, stones, glass, and other things; it is therefore very valuable in trade.

Section 2.—Mineralogy.

Q. What are meant by the mineral productions of the earth?

A. Anything dug out of the earth in mines. Minerals may be divided into four classes:—1st, Earthy, or the stones; 2d, Saline, or the salts; 3d, Inflammable, as sulphurs; 4th, Metals, or metallic ores.

Q. How are the earthy minerals divided?

A. Into the siliceous or flint genus, and the clay genus.

Q. What is included under the flint genus?

A. All marbles, stones, flints, and precious stones. The clay genus includes common clay, sand, gravel, or other moist earths.

Q. *What are the* saline or salt minerals?

A. They contain a mixture of acids with alkali, as saltpetre, nitrate of potash, common salt, sal ammoniac, &c.

Q. What is alkali, or kali?

A. A kind of salt, sometimes called soda, found in burnt vegetable of that name. Potashes are the ashes of other vegetables.

Q. Where is saltpetre found?

A. It is a kind of salt, found on the surface of the earth in Africa, India, and some parts of the South of Europe. It is sometimes called nitre.

Q. What is nitrate of potash?

A. A mixture of nitre and potashes. These earths are all found mixed or combined; but the same can be produced by chemistry.

Q. What are acids?

A. They all belong to the class salts; and by mixing with alkali produce many useful minerals.

Q. What are the inflammable minerals?

A. They include sulphur, resins, bitumens, graphite, and all combustible bodies, except metals and the diamond.

. What is included under minerals of fourth class?

. All substances composed, either tly or entirely, of metals.

. What are the principal precious es included under the first class of erals?

. The diamond, the ruby, the emerald, topaz, the garnet, the sapphire, the thyst, the beryl, the carbuncle, the nelian, the chrysoprase, opals, the turise, &c.

. Where are diamonds found?

. The best in the mines of Golconda India. The diamond is a sparkling te; very precious as an ornament in ss; and, from its hardness, is used to glass. It was called by the ancients mant.

. Where is the ruby found?

. In the sand of the rivers of Asia. s of a bright red colour.

. Of what colour is the emerald?

. Of a dark but delicate green. It is ught from the East Indies.

. Is *the topaz* a valuable stone?

A. No; it is generally yellow, but some have been found pink, orange, and blue. The finest come from South America, and many parts of Europe.

Q. What is the garnet?

A. A fine stone of a deep crimson colour. There are mines of this gem in Bohemia.

Q. Where is the rich purple amethyst found?

A. In most Eastern nations; but the common amethyst, brought from South America, is of a pale violet.

Q. Of what colour is the sapphire?

A. Of a fine blue; found principally among the sands of the rivers in Ceylon.

Q. Are not the beryl and chrysoprase both green?

A. Yes; but the beryl is a sea-green, and the chrysoprase a delicate apple-green; it is brought from Germany, and the beryl from the borders of China.

Q. What is cornelian?

A. A stone useful for seals, necklaces, &c.; sometimes white and yellow, but usually a pale red. It is found in ıt countries, but the best are from ia.

ı Where are the opal mines?

.. In Hungary. Opals are half transent, and have a whitish cast, but n held to the light they appear of erent colours.

.. What is turquoise?

.. A soft stone, of a pale blue colour, ıd in the mines of Persia. The sians and Turks consider them very ıable as ornaments. They are brought England from Russia.

.. What is jasper?

. It is a very hard stone, with stripes shades of different colours with black ; used for ornamental purposes; also pillars in large buildings. There are quarries in Spain.

.. What is lapis lazuli?

. A beautiful dark stone, with dots golden veins; chiefly found in Asia.

What is ultramarine?

A preparation made from the lapis la-. It is a beautiful blue, and very useful rtists for oil and water-colour drawings.

Q. Of what use is common soot?

A. It is a kind of earth formed by the smoke of chimneys. The colour called bistre, used by artists, painters, and dyers, is made from boiled soot; lamp-black is made from the soot of incense.

Q. What is ochre?

A. A kind of yellow earth found in iron, copper, and lead mines; much used by artists for painting.

Q. What useful things are included in the second class of minerals?

A. The principal are the two sorts of alkali. Soda and kali form a mixture, of which with acids and other minerals, by a chemical process, many useful drugs may be produced.

Q. What are Epsom salts?

A. They are a mineral found on rocks and stones, or dissolved in springs, at Epsom in Surrey. Seidlitz salts or powders are brought from Bohemia.

Q. What is alum?

A. A kind of salt dug from the earth, containing sometimes sulphur and clay; *it is* useful in manufactures, in dyeing, tanning, preparing paints, in making paper, to refine wine, to whiten bread, and to harden candles.

Q. By whom was it introduced into England?

A. By Sir Thomas Chaloner; who discovered that the mineral he found while in Italy, was the same as one on his own estate in England.

Q. How is bay-salt made?

A. By the influence of the sun's rays. It is principally in France that bay-salt is made. It is of a brown colour; hence its name.

Q. Is not vitriol a mineral salt?

A. Yes; it is found in European countries. The Roman vitriol is blue; that of Sweden and Germany, greenish; there is also a white kind.

Q. What is borax?

A. A mineral salt used in medicine, also for soldering gold and silver.

Q. What is the asbestos?

A. A kind of saline mineral, like a silvery white stone. The filaments or silky threads were made into a kind of cloth among the ancients in which to burn their dead.

Q. On what account?

A. Because it will not burn, but becomes white by the heat; the ashes of the dead person were more easily collected. This cloth was called amicanthus.

Q. What is umber?

A. A kind of earth from which a dark colour is made. Used by painters, &c.

Q. What is included under the third class of minerals?

A. Sulphur, resins, mineral pitch, graphites, and all kinds of coal.

Q. What is sulphur?

A. A hard mineral of a yellowish colour, used in medicinal cases; and when mixed with saltpetre and charcoal, makes gunpowder.

Q. Who discovered the use of gunpowder?

A. Roger Bacon, a monk; but a monk of Cologne, named Swartz, had already found that these three ingredients would *cause* explosion.

Q. What is amber?

A. A beautiful yellow resin, found in the mines of Prussia and on the coasts of the Baltic and Adriatic; very useful in medicine, and sometimes for ornaments.

Q. Is amber all one colour?

A. No; there is white, yellow, and black amber. The white is most useful in medicine; the yellow and black for beads and ornaments.

Q. What is black amber generally called?

A. Jet. It is light, smooth, and pitchy, and formed in the earth like coal; it readily takes fire and flashes.

Q. What is ambergris?

A. Some persons suppose it to be produced from a fish, or distilled from a tree; but is more likely to be a resinous mineral of a fragrant smell, and very useful in medicinal cases.

Q. What are graphites?

A. Minerals containing iron; one of which is plumbago or black-lead used for pencils. The best mines for this are in *Cumberland.*

Q. Where is arsenic found?

A. Mostly in copper mines. The white arsenic is a fierce poison; red arsenic is made by mixing white arsenic with sulphur. Yellow, red, and green arsenic are used by oil and water-colour painters, also by dyers.

Q. Is not verditer used by artists?

A. Yes, it is a mineral used sometimes for a blue, but more frequently mixed with yellow for green. Most colours used by painters and dyers are prepared from coloured earths, minerals, or plants.

Q. Where is the calamine stone found?

A. Plentifully in Germany, the Netherlands, and England. It is burnt and ground in a mill.

Q. What is smalt?

A. A kind of mineral stone, prepared and purified abroad, and brought to this country, sometimes as a blue powder, and sometimes in lumps.

Q. From what is it produced?

A. From cobalt, a mineral, containing a little silver, some copper, and a great *deal of* arsenic. Smalt is used with starch, and is known as powder-blue. Colours for artists, dyers, and painters, are made from smalt and cobalt. There are mines of cobalt in Saxony.

Q. What is included under the fourth class of minerals?

A. Minerals from which metals are extracted. They are subdivided according as they agree or differ in shape, quality, colour, hardness, &c.

Q. How are metals found?

A. They are seldom found in a native state, except gold, silver, platina, and copper; but combined with sulphur, acids, or in the state of oxides.

Q. What has arisen from this combination?

A. The four genera of metals called **ores**: the alloys, the sulphurets, the oxides, and the salts.

Q. Of what do these genera consist?

A. The alloys consist of pure and impure metals in one ore; the sulphurets, of metal and sulphur; the oxides, of oxygen and metal; and the salts, of a mixture of *metals and acids.*

Q. Are not certain metallic ores found in particular rocks?

A. Yes, brimstone is found in granite, and in some kinds of slate, but never in limestone; certain ores are also found together, as lead with zinc, and copper with lead and iron.

Q. Where are gold and silver found?

A. In primary rocks, with porphyry and sandstone. Gold has been sometimes found in coals, and among the sands of rivers; iron is found in every kind of rock.

Q. How many principal metals are at present known?

A. Twenty-eight; ten malleable, five fusible, thirteen fused with difficulty. These last eighteen are all brittle.

Q. Which are the malleable metals?

A. Platina, gold, silver, mercury, copper, iron, tin, lead, nickel, and zinc.

Q. What is meant by malleable?

A. Anything that can be bent, beaten, or stretched out, without breaking, is malleable. Gold is the most malleable of all the metals; and being also the *heaviest*, is therefore the most valuable.

Q. What country has always been famous for gold?

A. Africa; but the quantity of gold now sold in England is brought from Peru and Chili in South America. The principal gold mines of Europe are in Hungary and Spain. Gold has also been lately found in large quantities in California, a peninsula of North America.

Q. Where is silver found?

A. Silver is a white shining metal found in all parts of the world, but chiefly in the mines of Potosi, in South America. Gold, silver, and platina are called perfect metals, because they lose nothing by the heat of the fire.

Q. What is platina?

A. A white metal, unknown to the ancients, not so bright as silver, found in small grains, in the sands of the American rivers. It would be very valuable and useful could it be found in sufficient quantity, as its qualities are equal to those of gold and silver.

Q. Why are all metals besides gold and *silver called imperfect*?

A. Because they can be melted or turned into powder by the heat of fire, and dissolved or rusted by acids.

Q. Where is quicksilver found?

A. In Germany, Hungary, Spain, Italy, and South America. Quicksilver, or mercury, is an imperfect metal, resembling melted silver; it is useful for many things, but chiefly for separating other metals from their ores.

Q. Have not the changes of the atmosphere great effect upon mercury?

A. Yes; and on this account mercury is used in barometers and thermometers, for in hot weather it rises, and in cold weather it sinks, and the degrees of heat and cold, wet and dry, can be ascertained. Mercury is very useful in medicine; calomel is made from it.

Q. Where is copper found?

A. In all parts of the world; the best is from the mines of Sweden, and Paris mountain in the isle of Anglesea. Copper is of a reddish colour.

Q. How many kinds of copper are there?

A. Three; common, rose-copper, and

virgin-copper. When copper is mixed with a large quantity of tin, it makes bell-metal, of which bells, stew-pans, &c. are made.

Q. What is bronze?

A. Copper mixed with a small quantity of tin. Bronze is used for statues; and in olden times the ancients wore bronze armour. Copper mixed with zinc makes pinchbeck.

Q. Of what colour is pinchbeck?

A. Nearly the same as gold; it is used for watch-cases and other things.

Q. What is verdigris?

A. A green rust sometimes found on copper, very poisonous, but used by dyers for dyeing black, and when mixed with logwood it makes a beautiful green for painting.

Q. Which is the most useful metal?

A. Iron; it is found in all parts of the world; the best iron mines of England are in Colebrook Dale, in Shropshire, and the forest of Dean in Gloucestershire.

Q. How many kinds of iron are there?

A. Three: cast-iron, forged-iron, and

steel. Cast-iron is iron melted in a very hot furnace, and poured or cast, while liquid, into shapes made of earth, such as cannons, pipes, grates, &c.

Q. What is forging iron?

A. Beating it while red-hot with large hammers into the shapes required, as horse-shoes, &c.; it is sometimes called wrought-iron.

Q. What is steel?

A. It is formed by heating bars of iron with charcoal ashes and bone shavings, to render it whiter, closer grained, and capable of bearing a very high polish.

Q. How is steel made hard or brittle?

A. By being thrown into cold water when quite hot. Steel is very useful on this account for all kinds of cutlery, because it can receive a sharp edge or point, as a razor, or a needle.

Q. What is emery?

A. A kind of heavy iron ore found with other minerals, and which, when ground to powder, is very useful for smoothing precious stones, cutlery, glass, *&c.*

.. Where is the loadstone found?
. In iron mines in Germany, Eng-
l, Arabia, Bengal, and China; it will
act any other piece of iron or steel
ed near it. Every magnet has two
s, one pointing north, the other
th, which causes its great use in navi-
ion.

. What is tin?
.. The lightest of all the metals; it is of
hitish colour, and being free from
t, it is very useful for cooking-vessels.
ck tin is formed by pouring melted
into stone moulds, shaped like sauce-
s, kettles, &c. &c.

. What English county is famous for
?
. Cornwall. The Phœnicians traded
this country for tin 700 years before
rist, and it is supposed the name
tain given to the island is derived
m this circumstance.

. Where are the best lead mines?
. In England; the most important
in Cornwall, Devonshire, Northum-
land, *Durham*, and some parts of

Wales. Lead is a soft metal, but very heavy.

Q. For what is it used?

A. For covering houses, making pipes, cisterns, &c.; and when mixed with tin it makes pewter.

Q. What is white-lead?

A. Common lead corroded by the steam of hot vinegar; it is used by house-painters to thicken and dry their paints. White-lead is a slow poison; the smell of a newly painted house is therefore very injurious.

Q. Is not a preparation of lead used by artists?

A. Yes; it is called red-lead, and used also by potters and surgeons.

Q. What is vermilion?

A. A beautiful red, prepared from mercury.

Q. What is zinc?

A. A brilliant white metal, very useful for manufactures, as it mixes well with most other metals.

Q. What is meant by alloys?

A. *Alloys* are portions of inferior metals mixed with superior, such as copper with gold to render it harder, &c.

Q. Which are the fusible metals?

A. Bismuth, antimony, tellurium, arsenic, and chromium. These are all fused easily.

Q. What is meant by fusible?

A. Anything that can be melted by heat is fusible; all metals are fusible, but some not without violent heat, as gold, silver, iron, &c.

Q. What is bismuth?

A. A mineral sometimes found in silver, but more commonly in tin mines, by some supposed to be tin in an imperfect state, and frequently called tin-glass. It is glossy, white, and shining, and very useful to chemists.

Q. What is antimony?

A. A mineral found in all mines, but chiefly in those of silver and lead; it is similar to black-lead, and very useful in medicine and surgery. Letters for printing are made of lead mixed with antimony.

Q. What is tripoli?

A. A kind of earth mixed with sulphur, used for polishing metals and stones; first brought from Tripoli in Africa.

Q. What is rottenstone?

A. An earth of the same description found in Derbyshire and Stafford.

Q. Of what are tobacco-pipes made?

A. Of a fine clay, called pipe-clay; also used for yellow ware.

Q. Which are the most useful metals that are fused with difficulty?

A. Cobalt, manganese, and many others, chiefly useful to chemists and surgeons.

CHAPTER VI.

CHEMISTRY.

Q. WHAT is Chemistry?

A. The science of separating and mixing the various substances of which the earth is composed.

Q. What was the opinion of the ancients respecting the materials of which *the earth* is composed?

A. That they consisted of four elements, earth, air, fire, and water.

Q. What have been the discoveries of modern chemists?

A. These four elements have been analysed, and other elements, of which they are composed, have been discovered.

Q. What are these simple elements?

A. Oxygen, hydrogen, nitrogen, chlorine, carbon, sulphur, phosphorus, nine earths, and above thirty metals.

Q. Of what is the air we breathe composed?

A. Of oxygen and nitrogen; 100 parts of atmospheric air contain 22 parts of oxygen gas, and 78 of nitrogen. These elements are preserved in the form of gases by a state of motion.

Q. What is gas?

A. A kind of invisible fluid produced from many substances. The gas which is used to light our streets and dwellings is produced from carbon, or coals.

Q. Of what is water composed?

A. Of hydrogen and oxygen; the latter *in the greatest* quantity: 100 parts of water consist of 85 of oxygen and 15 of hydrogen; these are both produced from water by heat in the form of gases.

Q. What is chlorine?

A. A kind of acid gas of a yellowish-green colour, produced from many substances, but particularly from common salt.

Q. What is carbon?

A. It is the foundation of almost all animal, vegetable, and solid substances. Charcoal is impure, and the diamond is pure carbon.

Q. What is phosphorus?

A. A simple substance extracted from the bones of animals while in a state of decay.

Q. Which are considered the active or universal elements of Nature?

A. Oxygen, nitrogen, hydrogen, and, perhaps, caloric and light.

Q. What are the nine earths discovered by chemists?

A. Alumine, barytes, glucine, lime, magnesia, silex, strontia, yttria, and *zircon*.

. Which of these are most impor-
?

. Alumine, lime, magnesia, and silex.

. What is alumine?

. It is pure clay; it cannot be melted,
is rendered hard by heat, and from
readiness to absorb water and grease
f great use to fullers for scouring and
ning cloth; it is then called fullers'-
h.

. What is lime?

. Lime is produced by burning chalk,
ble, limestone, &c.; by the heat the
onic acid gas is expelled, and the
remains.

. What useful cement is made from
?

. Mortar; after the lime has been
nt, it is mixed with water, ashes, and
d, to cement bricks in building, and
n dry it hardens. Lime is also used
anning.

. How is magnesia found?

. Generally combined with sulphur;
s a soft white earth, very useful in
licine. *Epsom* salts are formed by

a union of magnesia with sulphuric acid.

Q. What is silex?

A. The principal composition of stones; it cannot be melted with any heat, but when combined with alkalies, as soda and potash, it forms glass.

Q. Which are the two fixed alkalies?

A. Soda or kali, and potash; there is also a volatile alkali called ammonia, obtained from animal substances.

Q. How are chemical combinations produced?

A. By caloric, or that power which produces heat.

Q. What are some of the terms used to express chemical operations?

A. Combinations, solutions, fusion, calcined, combustible, inflammable, and affinity.

Q. What are combinations?

A. The mixture of two or more substances. A solution is produced by dissolving a substance in water, and a fusion *by melting* it.

What is calcined?

Any substance burnt or reduced to powder by heat is calcined.

What is meant by inflammable and ustible?

. Those substances are inflammable combustible which readily take fire n in contact with each other, or by influence of caloric.

. What is meant by chemical affinity?

. It is the force with which the pars of many substances unite, either rally, or by chemical combination.

. Which are the principal chemical binations?

. Acids and salts, produced by uniting gen with other substances.

. How many acids have been disred?

. Nearly forty. There are four kinds; mineral, the vegetable, the metallic, the animal; they are all produced by mbination with oxygen.

. Mention a few of the mineral acids.

. Sulphuric acid, nitric, muriatic, *onic, phosphoric,* and the arsenic.

Q. How are these produced?

A. By oxygen with sulphur for sulphuric acid; with nitrogen, for nitric acid; and so on.

Q. What is muriatic acid?

A. Acid produced by a combination of oxygen and chlorine; when mixed with soda, it is called muriate of soda, and is the common salt of the table.

Q. Name some of the vegetable acids.

A. The oxalic, the tartaric, and the camphoric; prussic acid is from the animal kingdom.

Q. Are acids combined with other substances?

A. Yes; to make salts, they are combined with alkalies, earths, and oxides, and form some thousand combinations.

Q. What is the chemical name for these salts?

A. Sulphates. Sulphuric acid is known as oil of vitriol.

Q. How may acids be distinguished from alkalies?

A. Acids excite a sour taste in the *mouth,* and change vegetable blues into

s. Alkalies excite a burning taste, and
. convert vegetable blues into greens.

ı. What is the process of combustion?

.. During the burning of any com-
tible body, the oxygen from the atmo-
ere is absorbed by the influence of
ric, and a separation of the parts
es place.

ı. What are oxides?

.. The combination of oxygen with
als when exposed to heat, and in
ss quantity than for acids, produces
ind of rust on the metals called oxides.

ı. How are gases produced?

.. Gas is separated from the element
which it is a part by fire.

ı. What are mineral waters?

.. Water containing oxygen and ni-
gen gases, or acids, alkalies, and
tral salts.

ı. How can these be discovered?

.. By introducing an infusion of violets;
he water contains acids they will turn
en; if alkalies, red.

ı. How may sulphur and bitumen be
ected?

A. By the smell or taste; iron will tinge the water blue if a mixture of prussic acid and potash are introduced.

Q. How is copper detected?

A. It will show itself on a piece of bright iron put into the water. Arsenic in water will turn copper white.

Q. Which of the chemical combinations are inflammable?

A. Sulphur, carbon, hydrogen, and phosphorus, and all acids formed by a combination with oxygen.

Q. What are the uses of chemistry?

A. It is of great use in manufactures, such as dyeing, &c.; also in preparing medicines, and in many of the refinements and elegancies of life.

Q. What is aqua-fortis?

A. A mixture of clay and nitre or saltpetre; all metals, except gold and silver, can be dissolved in it.

Q. Is it not used by dyers?

A. Yes; tin dissolved by it, and mixed with madder, makes a beautiful scarlet dye.

Q. What is copperas?

ı. A salt formed from iron and sul-
ıric acid; it is a bright green, and
d by dyers and tanners, and in making
.

ı. What other materials are used in ink?

ı. Gall-nuts and gum-arabic.

ı. What is white vitriol?

ı. A mixture of sulphuric acid and
:, much used in medicine, and by
rs and varnishers.

ı. What is alum?

ı. A mineral salt, of great use in many
ıufactures.

ı. What is sal-volatile?

ı. A volatile salt composed of sal-
ıoniac and tartaric acid, and softened
h spirits of wine; it is often scented,
. very useful in medicine.

ı. Of what is tin-foil made?

ı. Of a mixture of tin and quicksilver.

ı. How is the permanent marking-ink
le?

ı. It is made by dissolving nitrate of
er in water with gum.

ı. What is caustic?

ı. *It is made* from silver dissolved in aqua-fortis, which forms a crystal, and is afterwards melted to form lunar caustic. It is used by surgeons to burn away proud flesh, &c. from wounds.

Q. What is crystallization?

A. When acids are dissolved in water, filtered, and the moisture allowed to evaporate, the particles fly upwards, and being hardened, form curious or sparkling masses, as ice on the window in frosty weather. Metals are crystallized by heat.

Q. What is the calx of lead?

A. The dross found on lead while melting. Red and white lead, so much used in paints, are the calces of lead, and will extract poison from lead.

Q. What is solder?

A. It is used as a cement, and is made of two-thirds lead and one-third tin melted together.

Q. Of what is shot made?

A. Of lead mixed with arsenic, which makes it harder and more brittle.

Q. What is goulard?

A. A salve used to allay inflammations; *it is* prepared from lead.

CHAPTER VII.

MANUFACTURES.

Section 1.—*Silk, Wool, Flax, etc.*

ı. WHAT is the origin of the word
nufacture?

ι. It is derived from two Latin words,
ıus, the hand, and *factus*, made.

ı. What were originally the principal
hines used in manufactories?

ι. The distaff, the loom, and the mill-
eel; the distaff and loom were an-
ıtly worked by the hand, and the
l-wheel turned by wind or water,
now most machinery is worked by
ım.

ı. Of what use are the distaff and
m?

ι. The distaff for spinning, and the
m for weaving. Silk, cotton, wool,
, and hemp, must all be spun and
ven to make articles for use.

ı. Of what use are mills?

ı. *Mills turned* by machinery, or by

steam, are now used for spinning and reeling cotton, silk and wool.

SILK.

Q. What are the processes silk must undergo before it is woven into satin, velvet, or silk, for dresses, &c.?

A. Spinning, reeling, bleaching, and dyeing.

Q. What is reeling?

A. The cocoons, or balls of silk spun by the silkworm are thrown into warm water, and the ends of the threads being found, several are joined together and wound on reels; it is then called raw silk.

Q. Of what are satins and velvets made?

A. Of silk which has been wound from the cocoons while in boiling water.

Q. What is done then?

A. It is cleansed, and afterwards spun into threads of different qualities as required by the weaver.

Q. What is weaving?

A. A kind of fine matting. Threads the length of a piece of silk are stretched on a loom to a proper tightness; this is called the warp; the threads which cross are called the woof.

Q. How are these twisted with the others?

A. The long threads are separated by an instrument, called a reed, into two sets, and by the working of a treadle, the two sets rise up and down alternately and the cross threads are inserted between them.

Q. What instrument is used to do this?

A. A little instrument, sharp at both ends, called a shuttle, contains the woof, and this is thrown across as the warp moves up and down, either by machinery, or by the hand.

Q. What is the colour of the silk when spun by the silkworm?

A. It varies from pale straw colour to deep orange. To produce white and the various colours it is first bleached and then dyed.

Q. What is the process of bleaching?

A. The silk is put into a thin linen bag, and boiled in soap and water, for two or three hours, it is then thrown into

cold water with a little ind
wards whitened with the fu
and then pressed.

Q. How are the patter
and silk produced?

A. The threads of silk
and then woven into pat
by parties employed for th

Q. How is the pile on ve

A. It is formed by the
warp being placed over a l
needle, in which is a chan
these threads are after
drawing a sharp tool alo
of the needle.

Q. Where was silk first

A. In the island of Cos
pelago. It was not long
the Romans; silk was br
from Serica, the native pla
worm.

Q. What was their opin

A. That it could not p
production of a worm, a
scarce among them, that
its weight in gold.

Q. When was the manufacture of silk introduced into France?

A. About the reign of Francis the First and Henry the Eighth of England. Silk is now manufactured in all the countries of Europe and Asia.

Q. What country is remarkable for this manufacture?

A. France, and the chief place of commerce for it is in Lyons, as all silk passes through that place.

Q. What place is noted for the weaving of ribbons?

A. Coventry, in Warwickshire.

WOOL.

Q. Is not the process of preparing wool and flax something similar to silk?

A. Yes, in the weaving, but wool requires picking, dressing, and carding, before it can be spun or woven.

Q. What is done first to the raw wool?

A. It is picked and sorted; this is very necessary, as the same sheep will sometimes produce wool of various qualities.

Q. What is next done?

A. It is cleansed and given to the wool-comber, who draws it through iron spiked combs of different degrees of fineness; the fibres are thus drawn out smooth and straight for spinning and weaving.

Q. For what is wool used?

A. For every description of hosiery, stuffs, carpets, flannels, blankets, and cloths.

Q. In what way does the weaving of carpets differ from that of cloth or silk?

A. Instead of the warp being laid horizontally or flat on the woof, it is placed upright.

Q. Whence have we the best carpets?

A. From Persia and Turkey and Brussels; but Kidderminster, Wilton, and Axminster, in England, are famous for carpets.

Q. How are the patterns formed on carpets.

A. The workman forms it from a coloured pattern before him formed in squares, like those used by ladies for their Berlin wool-work.

Q. What causes Brussels carpets to look like rich velvet?

A. From the threads being passed over a wire, which is afterwards drawn out, leaving a row of loops.

Q. Are not Wilton carpets made in a similar manner?

A. Yes, but the loops are cut. Axminster carpets are woven without a seam, and are very expensive.

Q. What towns of England are famous for the manufacture of woollen goods?

A. Leeds and Norwich for woollen cloths, Witney for blankets, Wales for flannels, Nottingham and Lancashire for hosiery.

Q. Of what are the finest cloths made?

A. Of Spanish wool obtained from the Merino sheep.

Q. Is not England famous for the manufacture of woollen cloth?

A. Yes, and it is considered the staple commodity of the kingdom, and to show the estimation in which it has always been held, the Lord Chancellor sits on a woolsack.

Q. Are not wool and silk often mixed?

A. Yes, and form stuffs of different names, such as poplin, &c. &c.; but the names given to these cloths very often arise from the names of the persons who invented them, or the place in which they were first made.

Q. Is not the fulling or scouring of cloth a great undertaking?

A. Yes, it is done by putting the cloth in the troughs of a mill in which are water, soap, and fullers' earth; it is here beaten and pressed, which not only cleans, but renders it stronger and thicker.

Q. Of what use is the teazle?

A. It is a valuable plant, the crooked scales of which are used to raise the nap on cloth; no machine can be made to produce the same effect.

FLAX.

Q. How is flax prepared for spinning?

A. Flax requires more operations both before and after weaving, than either wool or silk: when first gathered, the stalks are left for the seeds to ripen, and are then tied in loose bundles, and left to steep in stagnant pools for about fifteen days.

Q. What follows?

A. A fermentation by which the bark or flaxy substance is separated; this is afterwards beaten and drawn through two combs, one with coarse teeth, the other fine.

Q. What is the next process?

A. It is spun into threads by machinery, and then woven into linen, lawn, cambric, sheeting, &c. &c.

Q. Is the process of bleaching fine linen very tedious?

A. Yes; it is several times steeped in hot and cold water, sometimes with soap and wood ashes, then laid on the grass, and kept wet.

Q. What is done after this?

A. It is washed in skimmed milk, then in clear water, with blue starch, smalt, and gum; it takes a month in summer, and six weeks in winter.

Q. From what country is flax supposed to have been brought?

A. From those parts of Egypt frequently inundated by the Nile.

HEMP.

Q. Is not the preparation of hemp very similar to that of flax?

A. Yes, but the fibres of this plant are coarse, and, from their toughness, very useful for anything requiring great strength. After being gathered and steeped like flax to separate the fibres, it is carded and prepared for spinning.

Q. Where is hemp much cultivated?

A. In Russia, and also in the English counties Norfolk and Suffolk.

COTTON.

Q. What preparation does cotton require before weaving and spinning?

A. The wool which surrounds the seeds has to be separated from them by a machine, which, at the same time, loosens the fibres of the wool; it is then carded.

Q. What is the next operation?

A. It is wound upon cards in the form of cylinders worked by machinery, and then roved.

Q. *What* is roving?

A. Removing the loose fibres with an instrument resembling a comb; it is then twisted and drawn out into threads, and sent to the weavers.

Q. Is there not a machine which includes all these?

A. Yes, it is employed for carding, roving, and spinning, and is much used in America, where it was invented.

Q. What are the coloured dresses worn by ladies?

A. They are made of cotton, on which coloured patterns have been printed or stamped. This is called calico printing, and is a very extensive trade. Prints, muslins, chintzes, and other articles made of cotton, and sometimes linen, are printed in the same manner.

Q. What machines are used for this purpose?

A. Machines like a printing press, with blocks of wood, copper, or stone, cut in the forms of buds, flowers, or any other fancy pattern. The colours are the same as those used by dyers.

Q. What causes the variety of patterns?

A. Persons called designers are employed constantly to invent new patterns, and if a new one proves successful, they sometimes get £150, or even more for it.

Q. Is not dyeing also a very extensive business?

A. Yes, as silks, wools, and cotton, all require dyeing or printing to make them fit for use.

Q. Why is it that the colours on cottons or silks so seldom wash out, or fade so slightly?

A. Because every substance must be prepared, before it receives a colour, with what is called a mordant. Alum is used for linens and cottons, and solutions of metals for silk and wool.

Q. What countries of Europe now cultivate cotton?

A. Italy, Sicily, Malta, and also Asia Minor. Very fine muslins are also made at Glasgow and Paisley in Scotland.

Q. Of what is crape made?

A. Of silk and cotton. The creases in crape are caused by its being loosely *woven*. It was invented by the Italians.

PAPER.

. What are the principal uses of
ls ?
. Wind-mills and water-mills are used
grinding corn. There are also paper-
ls, powder-mills, saw-mills, sugar-mills,
mills used in preparing other articles
the loom or press.
. Is not the process of making paper
y interesting ?
. Yes; paper is made of linen rags,
ch are first carefully picked and sorted;
y are then torn to pieces by a machine
ch reduces them to a pulp.
. Describe this machine.
. It consists of a solid piece of wood,
which are fastened plates of steel,
und very sharp. This is fixed in a
gh with a certain quantity of water.
. What is in the bottom of the
gh ?
. A plate with steel bars also ground
rp. The rags are placed in the trough,
the engine being turned very quickly,

they are torn to pieces by passing between the two iron plates, and, in four hours, are reduced to a pulp.

Q. How is this pulp cleansed ?

A. The dirty water is constantly carried away, through a grating at one end of the trough, while clean water comes in at the other. The pulp, therefore, passes clean and white to another engine called the beating engine, which only differs from the other by moving more quickly.

Q. What is the next process ?

A. It passes from this to a large vat furnished with a mould, the size of a sheet of paper, and the bottom of the mould is like a sieve, with brass wires, through which the water is drained.

Q. What is done with it then ?

A. Each sheet of paper is placed upon a felt, or between two pieces of woollen cloth, one upon another, and then pressed, to squeeze the water from them.

Q. Is it again pressed ?

A. Yes, but the sheets are laid one upon another without the woollen cloths, and are pressed five or six times, and then ıg up to dry in rooms where there is 'esh current of air.

ı. In what state is the paper by this e?

ι. Like blotting paper, and it must refore be sized before we can write ›n it.

ı. Of what is size made?

ι. Of vellum shavings boiled in water h white vitriol and pounded alum; ›r being dipped in this, the sheets of ›er are pressed several times, then ıg up to dry, counted into quires and ms, and are then ready for sale.

ı. Is this kind of paper used by other ions?

ι. No, paper is sometimes made of ton and bark. The Indians and inese make it of silk rags and rice, l the Americans sometimes of straw. ırse brown paper is made of the ends ropes.

ɑ. From what did we derive the word ›er?

A. From an Egyptian reed called pa-*'us, growing* on the banks of the Nile, upon which the ancients wr is even now used for the pose.

Q. What is one great imp modern times in paper makin

A. That of bleaching the enables the manufacturer to finest paper of almost any kir

Q. When was the first erected in England?

A. In the reign of Elizabe ford, in Kent; but the use o known in the time of Harold.

Q. Upon what then did write their books?

A. On parchment; the anci wrote upon the bark of the as tree, called philyra—they call liber, which is Latin for book

Q. Which of our English derived from this?

A. Library and librarian French word livre, book.

Q. What were the books ancients like?

A. They were rolled like

ed end-ways on a shelf. We read he Bible of "the roll of the book."

.. Is parchment now used for writing n?

.. Yes, in law courts, for wills or ds; it is more durable than paper. e of the Roman manuscripts, written philyra, have lasted a thousand years.

.. Did the ancients write on any other stance?

.. Yes, on tablets of iron, brass, and .. They used, instead of a pen, an stylus, sharp at one end to write , and blunt and broad at the other scratching out.

.. Are pens now used by all nations writing?

.. No; the Turks, Moors, and other ern nations, write with reeds.

.. What improvement has been made ens?

.. Making them of steel, which lasts er than a quill, and saves much time, teel pens do not require mending.

.. Where were they invented?

.. In Birmingham; and three hundred pairs of hands are constantly employed in making them; each pen passes through fourteen processes before it is finished.

INK.

Q. What is required besides a pen in writing?

A. Ink; it is made of gall-nuts, copperas, and gum-arabic, but modern ink is inferior to that of the ancients, as may be seen by the colour of the ink in some old Saxon manuscripts.

Q. What is Indian ink?

A. A preparation made by the Chinese, supposed to be made of lamp-black and glue, but many persons think it is mixed with the liquid ejected by the cuttle-fish.

Q. Did not the Romans use this to write with?

A. Yes, and they called it sepia.

Section 2.—Printing.

Q. What is the printing-press?

A. A machine for printing a number

of words on paper quickly, instead of writing, to form books, as in ancient times.

Q. Who introduced printing into England?

A. William Caxton, a merchant, who learnt it in Germany. The first book printed in England was on the game of chess.

Q. In whose reign was this?

A. In the reign of Edward the Fourth. Printing has been much improved since that time.

Q. How many kinds of printing are there?

A. Three kinds: one for books, another for linens and calicos, and a third for pictures.

Q. What is meant by a type?

A. The size or form of the letters or words; there are large and small types.

Q. What are the names of the different types?

A. The largest in general use for *printing books*, is English; the next Pica,

Small Pica, Long Primer, Bou
Brevier, and the smallest Nonpare
Pearl.

Q. What is printing ink?

A. A kind of black varnish, the n
of which is kept a secret by the
facturers.

Q. What are the different p
presses?

A. The printing letter-press, the c
plate printing-press, and the steam
ing-press.

Q. What is the common printing-

A. A machine consisting princip
two parts, called the body and th
riage, between which the chase cont
the letters, and the paper on whic
are to be printed, are pressed toget

Q. What articles are required in
ing?

A. The composing-stick, the foun
taining the letters, the case, the
and the chase, or form.

Q. Of what is the composing
made?

A. *It* is usually made of iron or

and is used by the compositor to arrange the letters to form one page. They are placed in the galley.

Q. What is the galley?

A. A flat wooden instrument the size of a page. When as many pages are composed as will fill a sheet or half sheet of paper, they are put into the chase.

Q. What is the chase?

A. An iron frame, of different sizes, to contain large or small sheets.

Q. What is done to paper before it can be printed upon?

A. It is made wet. The stiffer the paper, and the smaller the type, the more wet it must be made.

Q. How are the letters inked?

A. By a roller, filled with printing ink, being passed over the type. The sheet of paper is then laid on a frame the exact size of the form or chase, and then rolled under the bed of the press.

Q. How is the impression made?

A. By turning the screw, which causes a weight to descend; and by another turn *of the* hand the sheet is given up printed.

Q. What is meant by the wor duodecimo, &c. &c.?

A. When a sheet of paper i into four pages it is called folio eight, quarto; in sixteen, octavo; twenty-four, duodecimo, &c. &c.

Q. What is meant by a stere

A. When the type or letters not likely to be altered, are co ranged, a cast is taken of the kept; so that a number of book printed at any time without th of composing a new type; Bibl reotyped.

Q. To whom are we indebte late great improvements in the press?

A. To the late Earl Stanhope greatest and most wonderful in the steam printing-press.

Q. Is not this useful in larg offices?

A. Yes: in consequence of rapidity with which so many s be printed. In the Times N *Office* ten thousand copies of paper can be printed in two hours and a half.

Q. What is Lithographic printing?

A. Printing from stone. It was brought into England about thirty years ago.

Q. What is the process?

A. A writing or drawing is made on stone, with a kind of thick oily ink or chalk; this is covered with ink of a different quality, the paper placed over it, and then pressed.

Q. What is the result?

A. The thick ink remains on the stone, and the other is transferred to the paper, producing the required drawing.

Q. Has this method been brought to great perfection?

A. Yes; so much so that many lithographic drawings appear like copper-plate or steel engravings.

Q. How are copper or steel-plate engravings printed?

A. By a very different process. The copper or steel-plate press is formed of *two rollers*, one placed over the other,

with only room for a board t
between them.

Q. What is next done?

A. The steel or copper-plat
the drawing is indented is sl
to liquefy the ink, the paper is
it, and then covered with a s
placed upon the board betwe

Q. How is the roller t
presses them together?

A. By a cross lever, and
immediately produced.

Q. Are not calicos and mu
in this manner?

A. Yes: by the same press.
on wood are printed by the

Q. How are the drawings
the wood and copper, &c. &c

A. They are cut or drawn
instrument: but sometimes
on copper, steel, &c. is done b

Q. How is that?

A. The metal to be drawn
with wax, and the drawing
upon the wax by a pointed
which cuts it through to the

Q. What follows?

A. The aqua-fortis is spread over the ıx, but it only reaches the metal where e marks of the drawings are made, and corrodes or eats into it exactly in the rm of the engraving intended.

ction 3.—*Cutlery, Glass, and other Manufactures.*

Q. Is not machinery much used for tlery?

A. Yes: the chief places for cutlery d metallic wares are Birmingham and ıeffield.

Q. What is the first operation metals ıdergo before they can be manufactured to knives, scissors, &c.?

A. They go to the foundry to be elted in a furnace, and are either made to moulds the shape required, which is lled casting, or are sent to the cutler, ıo, by machinery or the hand, forms em into all the useful things we require.

Q. What articles are mostly cast in ulds?

A. Guns, cannons, bells pans, candlesticks, braze figures, letters for printing indeed most things made brass, or bell-metal.

Q. What is principally a foundry?

A. A place in which lar kept for melting metals a naces are also used by plu and glass painters.

Q. What is a bellows-fu

A. A place in which th a flat hearth, behind which of bellows; the fire is th great heat while the metal

Q. Is not this somethin forge?

A. Yes: it is used by sm nails and horse-shoes. Go a bellows-furnace, silver a melted in a wind-furnace.

Q. What is a wind-furn

A. A furnace with a hole *through* which the air pas *similar* effect to a pair of

Q. What is an anvil?

A. A kind of iron table mounted on a wooden block: it must be very smooth and hard, to enable the smith to work with a file, or hammer upon it without breaking.

Q. What are the workmen generally called who work metals?

A. Smiths; as goldsmiths, silversmiths, coppersmiths; and those who prepare steel articles for cutting, such as knives and scissors, are called cutlers.

Q. Why is steel used for these articles?

A. Because from its hardness it can receive a very sharp edge.

Q. How many hands does a pair of cissors pass through?

A. Sixteen or seventeen, and it under-
es fifty or sixty operations before it is
dy for sale; snuffers are made in a
ilar way.

. What other useful steel article
ses through many hands?

. A needle; the finest needles are
le at Whitechapel, in London, and
y thousand men, women, and chil-
are employed in making them.

Q. When were knives first made in England?

A. In the reign of Queen Elizabeth. Forks were not introduced until the reign of James the First, and it was even then considered affectation to use them instead of the fingers.

Q. How are modern forks made?

A. They are made upon an anvil, and the prongs are stamped and ground upon a dry stone.

Q. How many hands does a table-knife pass through?

A. Sixteen; it passes one hundred and forty-four operations before it can be used.

Q. Is this done quickly?

A. Yes; by the help of machinery, a dinner-knife at Sheffield is shaped in a few minutes.

Q. Of what are pins made?

A. Of brass wire tinned. When the pins are formed they are placed in a vessel between tin plates; it is then filled with water and tartaric acid, by means of which the tin is dissolved, and after a five or six hours' boiling the pins are found tinned.

Q. What causes the tin to unite with the brass?

A. The zinc, of which brass is partly formed.

Q. How are pins polished?

A. They are thrown into a tub containing bran, and a wheel or shaft in the centre turning them round quickly they are soon rubbed bright.

GLASS.

Q. How is glass made?

A. It undergoes many operations, and the ingredients are soda, or kali, and flint.

Q. What is said to be the origin of the invention of glass?

A. It is said that some sailors cast on an island having made a fire of the herb called kali, found, that when burnt, it mixed with the flint stones on the shore and formed a kind of crystal, which by many improvements has produced glass?

Q. What is the first operation in making glass?

A. Melting in a furnace, it is then

called frit. To make it clear and white for window-glass or other things, it is again melted or boiled with manganese.

Q. What is the next operation?

A. It is then blown to make round glass, as phials and drinking glasses, or cast in moulds for plate-glass.

Q. How is glass blown?

A. By blowing through a pipe, something in the manner of making bladders with soap and water; the glass being hot can be formed into any shape while blowing. It is now generally done by a chemical preparation, which produces great heat, through a pipe, and the glass is worked while melting.

Q. When were drinking-glasses first used?

A. In the reign of Queen Mary; they were at first considered more precious than silver.

Q. How are looking-glasses made?

A. With plate-glass highly polished, and covered at the back with mercury or quicksilver.

Q. *How* is coloured glass produced?

A. By painting on the glass and then cing it in a furnace.

Q. When were looking-glasses first d in England?

A. In Queen Mary's time, but they re very little used, and were so small t ladies carried them in their pockets at their girdles.

Q. Where were the first glass windows n in England?

A. At Hesham Abbey, in Northumberd. They were made by some French rkmen; the Italians first used glass for ndows.

Q. Which are the chief manufacturing vns in England for glass?

A. Newcastle and Worcester.

EARTHENWARE AND CHINA.

Q. What are potteries?

A. Places in which earthenware is made; best ware is from China, and is called rcelain.

Q. What are the instruments used in tery?

A. The wheel and lathe; clay and flint are the chief ingredients.

Q. How are cups, basins, and jugs, or other round utensils made?

A. The flint is ground to a powder, and then melted with the clay till it becomes like thick paste, it is then turned round quickly by a wheel, and the potter forms it into any shape he pleases.

Q. How are flat or other shaped vessels made?

A. In moulds of gypsum; the clay articles are then baked for sixty hours in a kiln; in this state it is called biscuit.

Q. Is not the manufacture of porcelain very similar?

A. Yes; but while in a state of biscuit it is painted blue with cobalt, and then dipped into a glazing made of lead and glass, with other secret ingredients, and again baked for forty-eight hours.

Q. Will it now receive other colours?

A. Yes, and any gilding the pattern may require; it is then baked again for *ten* hours, and the gilding burnished with *bloodst*one or agate.

Q. Does the baking change the colours?

A. Yes; they are very dull and quite different before baking.

Q. What is the origin of the word porcelain?

A. It is the Portuguese word for cup, the Portuguese were the first who traded to China, and the chief articles they brought over were cups.

Q. Is not China-ware brought to great perfection in England?

A. Yes; for in Chelsea, Derby, and Worcester it surpasses most other china in beauty and elegance.

Q. From what is the purple colour produced on porcelain?

A. From gold; the yellow from silver, and the bronze from the oxide of iron.

TURNING.

Q. What is turning?

A. A kind of sculpture, or the art of fashioning hard bodies, such as wood, ivory, and brass, into round or curved shapes.

Q. What instruments are used?

A. A lathe, upon which the substanc is kept turning round like a wheel o its axis, and a chisel, or sharp tool, b which the outside is cut off as it turns.

Q. Is turning supposed to be ver ancient?

A. Yes; it is said by Pliny, and othe ancient writers, that the beautiful vase with their figures and ornaments, wer produced in this manner.

HATS.

Q. How are hats made?

A. By preparing the skins of variou animals, but principally the beaver. Th skin of this animal is covered with tw kinds of hair, the one long, stiff, an glossy, the other short, thick, and soft.

Q. Which hair is used for hats?

A. The short hair; it is scraped off an carded like wool, then beaten, presse and entangled together to form a kin of cloth called felt. It goes throug several processes, and is then blocked.

Q. What is the next operation?

A. *It is* sent to the dyer, whose copp

is so large that it will hold twelve dozen hats; these are boiled in the dye ten or twelve times successively for three-quarters of an hour each time; between each boiling they are allowed to cool.

Q. Of what is the dye made?

A. Of logwood, verdigris, copperas, and some other things. After this the hats are returned to the hatter, who dries and stiffens them with glue or gum seneca.

Q. What is the last operation?

A. They are steamed on an iron plate, dried, and then ironed.

Q. Who introduced hats into Europe?

A. Charles the Seventh of France, in 1499. Hats are also made of silk.

SUGAR.

Q. What preparation does sugar require?

A. It is gathered and carried to the mill, where it is pressed between two iron cylinders; the juice is received into a trough, and from thence conveyed to a *boiler*.

Q. What is thrown into the boiler?

A. Quicklime, which causes the oil ar acid to rise to the top with it; it is the skimmed off.

Q. When the sugar boils what is done

A. It is strained into another boile where it goes through the same proces this is repeated six or seven times; it then received into shallow wooden vesse called coolers.

Q. What change now takes place in th sugar?

A. It separates into grains, leaving th molasses or treacle; when dry it is calle raw or moist sugar.

Q. How is it made into white or lo sugar?

A. It is boiled over again with bullock blood and white of eggs, to purify it, ar then poured into a mould in the form a cone, and called a loaf of sugar.

LEATHER.

Q. How is leather made?

A. By preparing the skins of anima *The unprepared* skin is called a hide.

Q. What is the first operation it undergoes?

A. Soaking it in lime-water to cleanse it from grease and other impurities; the hairs are then scraped off with a kind of knife, and the oil and grease more completely removed by alkali or a solution of sulphur.

Q. What is done next?

A. It is taken to the tan-yard, stretched over a pit, and covered with tan for two months.

Q. What is tan?

A. The bark of the oak, chopped and ground by a tanning mill to a coarse powder.

Q. Are all skins tanned in this manner?

A. No; if they are intended for the upper parts of shoes, seats of saddles, or any purpose not requiring it to be very strong or water-proof, it is first sent to the currier.

Q. What is the currier's part?

A. His work is to scrape it, and reduce it to the same degree of thickness all *over,* and also to render it soft and flexible by oil or grease; tanned.

Q. What is the last proces

A. The skins are hung up air, the tan is then cleaned are stretched upon one ano them tight and straight.

GOLD WORKING.

Q. Is not gold worked upc gold wire and gold leaf?

A. Yes; gold wire is forn ing a piece of silver covere about the size of a tobacco-I a number of holes, the last al than the one before it, until i the hair of the head.

Q. What is leaf-gold?

A. Gold beaten with a h block of marble; it is said t of gold may be beaten into six leaves, each three inches squ

Q. What is gold thread?

A. Flattened gold wire twi *with a* wheel round threads o *bobbins.*

Q. What is shell-gold?

A. It is made of the parings of leaf-gold, ground into powder on a marble, and with honey. After leaving it some time to infuse in aqua-fortis, they put it into shells, to which it sticks.

Q. For what is leaf-gold useful?

A. For gilding picture and looking-glass frames, leaves of books, and other ornamented goods.

Q. What is sometimes used with gold for gilding?

A. Vellum, and leaves made of the entrails of an ox; the gold is interlaid with these substances, covered with parchment, and beaten to their size; and it can then be laid on the article to be gilded.

Q. What is gold-beater's skin?

A. A skin for healing wounds, prepared in the same manner.

Q. Is gold ever applied in a liquid state for gilding?

A. Yes; quicksilver dissolves gold and unites with it. Buttons are gilded with *liquid gold*; they are dipped in and then

exposed to a great heat, b
quicksilver is evaporated, ar
left upon the buttons.

Section 4.—*Brewing, Disti*

Q. How are beer, wine, a
made?

A. By brewing and distilling

Q. What is brewing?

A. The operation of prepari
beer from malt and hops.

Q. What is malt?

A. It is made from barley st
water for two or three days; the
then drained off, and the grain
heated, swells, bursts, becomes sw
is in a state of fermentation.

Q. What is fermentation?

A. Fermentation is a kind of
or decomposition which all ve
undergo, either while vegetating
ground, or in a state of decay.

Q. Does not this cause the
sprout?

A. Yes; but this is stopped b
the malt into a kiln, where it is

a gentle heat, and is then fit for mixing with hops to make beer.

Q. What is this first fermentation called?

A. Saccharine, from its sweetness.

Q. What is the first process in brewing called?

A. Mashing. The malt is steeped in warm water in a mashing-tub; after water has been added two or three times, the water is drawn off, and is called wort.

Q. Is not this done twice?

A. Yes, and the wort is again drawn off; the first is called sweet wort, from the sweetness of the malt.

Q. What is the next process?

A. The two worts are mixed, the proper quantity of hops added, and the whole closely covered and gently boiled for an hour or two; it is then strained from the hops into coolers.

Q. How is it fermented?

A. When cool some yeast is added, and it is left to ferment for a certain time.

Q. What is yeast?

A. A kind of thick froth pro
the fermentation of malt; by
tion the liquor is preserved fro
sour. Yeast is used in making

Q. How many kinds of fer
do vegetables undergo?

A. Three: the first sweet, t
vinous or acid, the third putri
fore all fermented liquors r
ferment for a certain time, or
become decomposed.

WINE.

Q. How is wine made?

A. By pressing the juice fr
in a machine called a wine-p
countries famous for wines g
cultivated in vineyards, and th
gathering them is called the vi

Q. What are the processes
white and red wines?

A. The grapes for red wines a
or squeezed with the hands b
are pressed; for white wine
are put into the wine-press im

Q. Is not the difference caused by the red and white grape?

A. No; as sometimes the skins of the purple grapes are taken off, and the inside only used for wine.

Q. What is the process after the juice has been pressed from the grape?

A. It is put into large tuns or barrels to be fermented; this is done with sugar.

Q. What is this fermentation called?

A. It is the second fermentation which vegetables undergo, and is called the vinous.

Q. What is the juice called before it is fermented?

A. It is called the mult, and the sediment at the bottom of the vessels in which it is contained is called the lees.

Q. Are the lees of wine useful?

A. Yes; a kind of potash or kali made by burning the lees of wine is very useful to dyers, and as a medicine for some diseases.

Q. What countries are famous for wine?

A. France, Spain, Portugal, and the

Madeira Islands; Hungary and Germany also produce some good wines.

Q. Which are the principal French wines?

A. Champagne, Vin de Grave, Pontac, Frontignac, Muscadel, Burgundy, Claret, and Hermitage.

Q. Are there not two sorts of Champagne?

A. Yes; still Champagne and sparkling Champagne. The difference is caused by the sparkling Champagne being bottled before fermentation has ceased.

Q. From what did this wine take its name?

A. From the province of Champagne, in which the grapes grow from which it is made.

Q. What are Frontignac and Muscadel?

A. White wines produced from the province of Languedoc; Muscadel is supposed to have its name from *musca*, a fly, because the fly is so fond of the grape of which it is made.

Q. What are Burgundy, Claret, and Hermitage?

A. Red wines. Burgundy takes its name from the province of Burgundy, Claret comes from the country near Bordeaux, and Hermitage from the banks of the Rhone.

Q. What are the wines most used in England?

A. Port and Sherry. Port is a red wine; it comes from Oporto, in Portugal. Sherry is a strong white wine brought from Xeres, near Seville, in Spain.

Q. What are the other Portuguese wines?

A. Lisbon, and white Port.

Q. What is the wine brought from Madeira, one of the Canary islands?

A. It is called Madeira; it is the most valuable white wine. Malmsey Madeira used to be called Canary sack.

Q. Which are the Spanish wines?

A. Mountain, or Malaga, Tent Wine, and Sherry. Tent Wine is so called because it is white wine tinted or coloured to produce a red wine. It is produced in Alicant.

Q. Which are the German wines?

A. Tokay, Hock, Rhenish, and Moselle. The grapes from which Tokay wine is made are so sweet that the hill on which they grow is called Sugar Hill.

Q. Are not some wines quite white, like water?

A. Yes, Hock and one or two other very expensive wines, not much used in England.

Q. What is cider?

A. The juice of apples fermented; perry is the juice of pears. These are both very pleasant, cooling liquors, and made in a similar manner to wine.

DISTILLING.

Q. What is meant by distilling?

A. It is the art of drawing off, drop by drop, the spirit from anything by heat.

Q. How is brandy distilled?

A. Fire is placed under a closed vessel, called a still, containing some weak French wines; the spirit rises in steam, and being enclosed cannot escape, but falls into liquid.

Q. Whence have we the finest brandy?

A. From Bordeaux, Languedoc, and Anjou. Cognac brandy comes from Anjou.

Q. Is brandy white when it comes from the still?

A. Yes; white as water, it is coloured by burnt sugar and other simple things. French brandy is paler than English.

Q. With what is Hollands or Geneva made?

A. With juniper berries. English gin is distilled from malt, flavoured with oil of turpentine, a few juniper berries, and hops.

Q. What is whiskey?

A. A liquor distilled from barley; it has a smoky flavour from the peat with which the still is heated.

Q. What cordials are made from brandy?

A. Noyeau, ratifia, and cherry brandy.

Q. How is Noyeau made?

A. By mixing white brandy, sweet and bitter almonds, and other kernels. Ratifia is made by infusing the kernels of cherries, apricots, and other fruit with brandy, and adding sugar, cinamon, cloves, &c.

Q. What is cherry brandy?

A. Cherries boiled with brandy; *the* juice mixing with the brandy takes *away* its strength. The cherries are put in whole.

CHAPTER VIII.

MATHEMATICS.

Section 1.

Q. How are mathematics divided?

A. Into pure, mixed, speculative, and practical.

Q. What are comprehended under pure mathematics?

A. Arithmetic, algebra, and geometry.

Q. What are mixed mathematics?

A. Astronomy, geography, and physics. Speculative mathematics are the relations and proportions of bodies.

Q. What is meant by practical mathematics?

A. Practical mathematics can be applied to the uses of life, as in mechanics.

Q. What are the uses of arithmetic *and* geometry?

A. Arithmetic treats of number, and geometry of size.

Q. What are the names given to geometrical figures?

A. Superficies and solids. Superficies consist of triangles and figures, with three, four, five, &c. sides.

Q. What are these figures called?

A. A figure of three sides is a triangle; a figure of four sides a quadrangle, a square, or a parallelogram.

Q. What are the others?

A. A figure of five sides a pentagon, of six sides a hexagon, of seven a heptagon, of eight an octagon, of nine a nonagon, of ten a decagon, and of many sides a polygon.

Q. What are angles?

A. Corners formed by the meetings of two lines; a right angle is one in which the lines are perpendicular to each other.

Q. What is an obtuse angle?

A. An obtuse angle is larger than a right angle, and an acute angle is smaller.

Q. Are triangles useful?

A. Yes; they each contain six parts,

and by means of an art ca
nometry, these sides are calcu
most problems in astronomy,
navigation, and surveying are

Q. What is included in mi
matics besides astronomy and g

A. Mechanics, physics, opt
matics, hydraulics, hydrostatic
tive, navigation, gnomonics,
nics, military and civil ar
and acoustics.

Section 2.—Mechanic

Q. What is the most useful
mathematics?

A. Practical; as under tha
mechanics and the wonderfu
mechanism in machinery or wo

Q. What are the principal
powers?

A. The lever, the wheel and
inclined plane, the pulley, t
and the screw.

Q. Of what use is the lever?

A. *It* is the foundation of
chanical powers. The use o

may be shown by placing a large heavy stone on the ground, and in front of it a smaller one; then push a walking-stick under the large stone, and balance it on the small one, the large stone will instantly be lifted with ease.

Q. Which is the lever in this example?

A. The walking-stick is the lever, the small stone the fulcrum, the heavy stone the weight, and the hand the power or force used.

Q. What is the wheel and axis?

A. It is simply a wheel turning on an axis like a carriage-wheel; the great power of a wheel consists in its large size in proportion to its axis. Wind and water mills are made on this principle.

Q. What is a cogged wheel?

A. A large wheel with notches or teeth moving another wheel (also with teeth) the contrary way; they are used to increase or lessen the motion.

Q. Are not clocks and watches made on this principle?

A. Yes; the ticking of a clock or *watch* is caused by the movement of these cogged wheels, which move a notch at a time.

Q. How are clocks and watches kept in motion?

A. Clocks are set in motion by a weight which turns a cylinder, and this sets all the wheels in motion.

Q. Are there many wheels?

A. Yes; of different sizes; also numbers of teeth to indicate seconds, minutes, hours, and even days and moons.

Q. How are watches set in motion?

A. By a coiled spring, which, in trying to unwind itself, sets one wheel in motion, and this turns all the others.

Q. What is a pulley?

A. A kind of small wheel, over which a string is passed, with a weight fastened to the end; this is called a moveable pulley, and is used to draw a great weight quickly from the ground.

Q. What are fixed pulleys?

A. They are used to balance weights, as in the window-sash or window-blind.

Q. What is the inclined plane?

A. A sloping surface used to carry weights from one level to a higher one. Something of this kind is used by bricklayers for wheeling heavy wheelbarrows.

Q. Of what use is the wedge?

A. The wedge is used to split rocks, trees, &c.; it is a thick piece of wood in the form of a triangle.

Q. What is the screw?

A. A spiral groove or thread winding round a cylinder, and when turned with a lever is of great force for moving weights or pressing bodies close together.

Q. Does every machine require all the mechanical powers?

A. No; mills, clocks, and watches, require only the wheel and axis. The simple printing-press is formed with the screw, the lever, and the wheel.

Q. What is the mechanical power employed in a common pump?

A. The lever, which is formed by the handle. A pump requires also valves, a piston, and a pipe.

Q. *How* is a pump made to act?

A. By raising the handle, the piston or rod, which contains a little valve or trapdoor, is pressed down through the pipe; the valve at the bottom of the pipe is closed, and the air passes upwards.

Q. What is caused by this?

A. A vacuum, or entirely empty space, which cannot be in nature, therefore, as the piston is again raised by pressing the handle, the water rushes up the empty pipe and passes through the nose of the pump.

Q. What are the principal parts of a steam-engine?

A. A large cylinder or barrel, a piston, valves, pipes, and a boiler.

Q. What is the principle upon whic steam acts?

A. The boiler is filled with boilin water, from which the steam passes in the cylinder; this cylinder has a close or valve, which rises as the steam rus in.

Q. What causes the lid to fall agai

A. Cold water, which is made to in for that purpose. The whole a of the steam-engine is caused by the rising and falling of this lid.

Q. How is this effected?

A. An upright iron rod is fixed to the lid, and also to the end of a large beam, which, by the action of the steam and cold water on the lid, is made to move up and down with it. The action is something similar to that of a see-saw.

Q. Has not steam been substituted for cold water?

A. Yes; Mr. Watt, of Birmingham, invented a machine in which the lid of the cylinder was moved both up and down by steam alone.

Q. What difference is there in the steam-engine of a ship and that of a railway-engine?

A. The beam and rod of the former work perpendicularly up and down, but that of a locomotive-engine horizontally, or backward and forward; by this means the wheels are made to move round.

Q. What simple cause gave rise to the knowledge of the use of steam?

A. The inventor observed the great

force of steam in lifting up the lid of a tea-kettle, and he and many others have since applied this wonderful power to the improvement of machinery.

CHAPTER IX.

OPTICS.

Q. WHAT is meant by optics?

A. The laws of light and vision, or the science which explains the causes of objects being presented to the eye.

Q. What is a transparent body?

A. Any body which affords a ready passage for light, as air, glass, water, &c.

Q. What are opaque bodies?

A. Those which do not allow light to pass through them, as wood, stone, &c.

Q. What is light supposed to be?

A. It is supposed by Sir Isaac Newton to be atoms in motion, infinitely smaller than grains of sand.

Q. Is the motion of light very rapid?

A. Yes; for the flash of a gun fired

at a great distance can be seen long before the report is heard, and the clap of thunder is not heard till some time after the lightning has been seen.

Q. What is meant by refraction?

A. When rays of light pass obliquely from one transparent body to another they are bent out of their course, and are called refracted.

Q. How can this be proved?

A. Put a stick in a glass of water, and the end will appear bent because of the refraction.

Q. Mention another experiment?

A. Place a bowl with a shilling in it where the eye can just see the edge of the shilling; without moving the eye, pour water on the bowl, and the whole of the shilling will be seen.

Q. What is reflection?

A. When rays of light striking against a smooth surface are sent back, they are reflected, as in a looking-glass.

Q. What is the reason that in some mirrors the image is inverted, or upside *down?*

A. Because the surface is convex or raised, like the back of a spoon; the inside of a spoon is concave.

Q. What are lenses?

A. Convex and concave glasses used by philosophers to produce new and important effects.

Q. Are there various forms of these lenses?

A. Yes; the plano-convex lens has one side flat, the other convex; and a plano-concave is on one side flat and concave on the other.

Q. What is a double convex?

A. Convex on both sides; a double concave is concave on both sides.

Q. What is a meniscus?

A. Convex on one side, concave on the other. Burning glasses are double convex. Furniture has been scorched by exposing a decanter of water, which is a double convex, to the rays of the sun.

Q. Is not the eye convex?

A. Yes; the images of objects are *reflected* through a kind of horny coat, called the cornea, and painted on the retina at the back of the eye; the cornea being convex, objects are inverted, but to the mind they appear erect.

Q. What is one reason for the dimness of sight in old persons?

A. The convex part of the eye becomes flattened, and the rays of light do not unite clearly on the retina.

Q. How are colours in objects produced?

A. By the different force of the rays of light reflected from them, the most forcible being red, and the least violet.

Q. Of what use are the concave and convex lenses?

A. They are very useful for spectacles, microscopes, telescopes, magic-lanterns, &c. &c.

Q. What is the usual form of glasses for spectacles?

A. Convex, as the eye having become flattened by age, the convex lens is of use to unite the rays of light.

Q. What is the cause of young persons sometimes wearing spectacles?

A. From the eye being too convex—

this is called near or short sighted. The lenses of these glasses are concave, to spread the rays and render the sight clear.

Q. What are the lenses used in a microscope?

A. As the object can be brought near the eye, the single microscope has but one convex lens, but a compound microscope has many, and some of them enable the eye to enlarge the object, at six inches distance, three hundred times.

Q. What glasses are required in a telescope?

A. As it is necessary in looking at distant objects to make them appear near, a convex glass is used; but as this reverses the object to the eye, two other eye-glasses are used, which set it straight again. Galileo's telescope had only one eye-glass.

Q. How was the telescope discovered?

A. It is said, some children of a spectacle-maker in Holland were playing with some of the lenses, when they placed the *flat* parts of two convex glasses together and discovered that on looking through them, a distant church appeared quite close.

Q. What followed?

A. Their father improved upon the idea, and after a few years the first telescope was made by Galileo, a native of Holland.

Q. What astronomer constructed a wonderful telescope?

A. Herschel. The tube was 39 ft. 4 in. long, and the diameter 4 ft. 10 in. The object was reflected by a mirror, and it had one lens; by it Sir W. Herschel discovered the planet now called the Georgium Sidus, Herschel, or Uranius.

Q. What lenses are used in a magic-lantern?

A. Two, one in the fore-part of the lantern, a double convex or plano-convex, very thick and of short focus; in front of this a glass slide is placed with the picture painted upon it inverted.

Q. Why is this?

A. Because the convex lens represents everything the contrary way to which it is placed; the picture is therefore thrown *on the wall* upright.

Q. Where is the other lens placed?

A. At the end of a sliding tube, so that it may be shifted backwards or forwards to a proper focus.

Q. What is the focus?

A. That point in a lens at which rays of light unite, and form a clear representation of the object.

Q. What is the cause of the rainbow?

A. The refraction and reflection of the sun's rays upon the drops of falling rain: the light must be twice reflected from the drops and once refracted or bent back, to meet the eye of the spectator.

Q. How should a person stand to see a rainbow?

A. With his back to the sun, as a rainbow must always be opposite to the sun, and can only happen while there is rain and sunshine.

Q. How is a camera obscura made?

A. By fixing a convex glass in a hole in a window-shutter; if all light is shut out, excepting that which passes through the lens, objects outside may be seen on a piece of white paper placed within the focus of the lens.

Q. Are they not inverted or upside down?

A. Yes; but by placing the lens in a tube inside a box, and a piece of ground-glass in the lid, the objects appear straight, and may be sketched and coloured from the representation on the ground glass.

CHAPTER X.

ELECTRICITY.

Q. WHAT is Electricity or Galvanism?

A. That power by which certain bodies when heated by friction attract other bodies to them.

Q. Give me a simple experiment?

A. If a piece of glass or sealing-wax be rubbed on a dry woollen cloth or silk, and instantly held over any small pieces of paper, they will be attracted to it, *raised on* end, or put in motion.

Q. Would light be seen if this w done in the dark?

A. Yes; and this light, faint as it n be, is called the electric fluid or fire.

Q. Describe a simple electrifying ı chine?

A. A glass cylinder is placed on a frai so that it can be turned rapidly round a handle, and if, while turning, a pi or a cushion of silk be near it, strea and sparks of fire can be produced.

Q. Will the electric fluid pass along bodies?

A. It will not pass along glass, sulpł charcoal, silk, burnt wood, or dry woo substances; these are therefore called n ductors.

Q. What bodies are conductors to e tricity?

A. All animals, animal and veget substances, metals, &c. &c.

Q. By what is the electric fluid ducted to other bodies?

A. By metallic wires. The revolv glass cylinder is placed on glass opposite to a metallic conductor with points. These points receive the electric fluid, and a person touching one of them, or wires with which they are connected, will perceive the electric spark.

Q. What are thunder and lightning?

A. Electricity in the clouds.

Q. What is the most wonderful power of the electric fluid?

A. Its power to contract the muscles of animals, such as man, &c. as it passes through them.

Q. How is this done?

A. If a plate of glass, in the form of a jar, be covered on both sides with gold, silver, or tin-foil, and one side brought in contact with the brass points of the machine, the jar will instantly be charged or full of the electric fluid.

Q. What should be done then?

A. The person who wishes to receive a shock should touch one of the brass points with one hand and the jar with the other; he will then feel a sensation as if some one had struck him a violent blow.

Q. *Is the* shock always the same?

A. No; a large jar will give a mu greater shock than a small one, a several jars together all charged are call a battery. Some batteries are so po erful that an ox may be killed by t shock.

Q. Who have been improvers of t science?

A. Galvani and Volta. The forn from his discoveries gave the names galvanism to electricity, and galvanic b teries to the electrical machines he vented.

Q. What is the Voltaic pile?

A. A kind of electrical machine vented by Volta, and the most perf in acting.

Q. What is the most wonderful use which electricity has been applied?

A. To the electric telegraph, by whi in a few seconds messages and inf mation can be sent many hundred mil

Q. How is this done?

A. Galvanic batteries are placed at t *telegraphic* office, to which are connect *four or* six metallic wires many miles length. The electric fluid passes through these wires as quickly as a flash of lightning.

Q. In what way are these wires made to convey the messages?

A. At the different railway stations, and in many parts of great cities, there are offices in which is a machine with a large face like a clock, with two movable hands.

Q. What is represented on the face of the clock?

A. Letters and figures signifying different words, easily understood after a little study; the wires are connected with the hands, and by the action of the electric fluid they move and point to the letters of the message sent.

Q. But how can the electric fluid turn the hands to the right letters?

A. Because there is another person at the other end of the wires, perhaps many miles off, who guides the hands on the face of his machine, and the same instantly appears on the distant one.

CHAPTER XI.

PHYSICS, ETC.

Q. OF what do Physics treat?

A. Of the properties of matter, and the laws of motion; or it explains the power by which we perceive solidity, softness, smoothness, quickness or slowness of motion, sour or sweet, &c. &c.

Q. What is meant by Pneumatics?

A. It is the science which treats of the various properties of air, with the clouds and vapours which float in it, called the atmosphere.

Q. What are the properties of air?

A. It is invisible, elastic, and can be compressed or exhausted by machines called Pneumatic machines.

Q. Mention some pneumatic instruments?

A. The air-pump, the syringe, the con*denser,* which is a kind of syringe, the air-gun, the diving-bell, the barometer, the thermometer, and the hydrometer.

Q. What is wind?

A. Air put in motion. The power of air when compressed may be known by filling a bladder with it; and no power can press the sides together without breaking the bladder, or allowing the air to escape.

Q. What is meant by hydrostatics?

A. It is the science which teaches the nature, gravity, pressure, and motion of fluids, and the method of weighing solids in them. The mechanical practice is called hydraulics.

Q. What is the science of hydraulics?

A. It teaches how to estimate the quickness or the force of fluids when in motion.

Q. What are generally called hydraulic machines?

A. All machines worked by water. The syphon, the common pump, the steam-engine, and fountains are some of them.

Q. What is meant by Gnomonics?

A. The art of making dials, or the science of shadows.

Q. What is meant by Pyrotechnics?

A. The art of making fireworks. It is also used in reference to the structure and use of fire-arms.

CHAPTER XII.

NAVIGATION.

Q. WHAT is Navigation?

A. It is the art of constructing and guiding a large ship across the ocean.

Q. To whom is the invention of navigation ascribed?

A. To the Phœnicians; but until about 400 years ago no sailor would venture out of sight of land. Columbus, who discovered America, would have lost his life among the sailors on board his ship had he not discovered land when he did.

Q. How was this?

A. Because the men were much alarmed at being so long out of sight of land; they did not believe that the world was round, and Columbus, who did believe it, expected to reach the East Indies by sailing round it westward.

Q. By what means do navigators now so easily discover their exact latitude and longitude in the open sea?

A. By the mariner's compass, which really means the thirty-two points of the circle of the heavens. The principal of these are called Cardinal points, north, south, east, and west; these are again subdivided into north-east, south-east, &c. &c.

Q. How can this compass be made useful to sailors?

A. By the magnetic needle, which is placed on a little pivot in the centre of the circle, and as this needle always turns to the north, whatever direction the ship takes may be easily ascertained.

Q. What causes the needle to be magnetic?

A. It is rubbed with the loadstone, or is itself a portion of the magnetic ore; this was discovered 500 years ago.

Q. Has the sailor no other guide but the loadstone?

A. Yes; by the position of the sun, moon, planets, and stars, a skilful navigator can always discover his position on the globe, but for some weeks it may be cloudy weather, which would prevent these from being seen; then the compass is a sure guide.

Q. What other articles are useful to sailors?

A. The Nautical Almanack, a telescope, a chart, representing rocks and shoals as well as places, and a quadrant.

Q. What is a quadrant?

A. A quadrant is in reality the quarter of a circle; the quadrant for navigation is a brass machine, numbered on the edge from one to ninety degrees, through which the altitude or height of the sun, moon, stars, &c. may be ascertained.

Q. Who was supposed by the ancients to have invented ship-building?

A. Dædalus; they pretend that the *wings he* used to escape from Crete were sails of a boat; but the moderns believe Noah to have been the first ship-builder.

Q. From whom did the Romans obtain their first knowledge of this art?

A. From the Carthaginians: but the art of shipbuilding has been brought to perfection by the English.

Q. Where are the principal dockyards?

A. At Woolwich, Portsmouth, and Chatham.

Q. What are the different names for ships?

A. Ships are divided into ships of war, and merchant ships. The frigate, or man-of-war, the ship, the brig, the sloop, or cutter, and various other names, according to the cargo they carry.

Q. What are the principal parts of a vessel?

A. The hull, the keel, the helm, the stern, the bow, the decks, the quarter-deck, the forecastle, the masts, and the rigging.

Q. What is the hull?

A. The body of the ship. The bow is the part that goes foremost, or in front.

The stern is the back or hind part of the ship, and contains the rudder.

Q. What are the parts within the hull?

A. The cabins, the steerage, the holds; and in men-of-war there are many decks, one upon another above the hold, which is the lowest part of the ship.

Q. What is the rudder?

A. A large piece of wood on hinges, which is turned by a wheel and chains on the deck; this is called the helm; by this the ship is guided.

Q. What is the anchor?

A. A large iron instrument something in the form of the letter T, which is thrown into the bed of the river, or anywhere near land; the anchor sticks fast, and keeps the vessel from floating away.

Q. How is the anchor drawn up again?

A. By a machine called a capstan, turned by a number of men, as it requires great strength.

Q. What are the portholes?

A. Holes cut in the hull of a man-of-*war, through* which the mouths of cannon *are placed* in battle.

Q. What are the names given to masts?

A. When there are two, the one nearest the bow is called the foremast, and the other the mainmast. If three, the middle one is the mainmast, and the one near the stern the mizenmast.

Q. What are the divisions of the masts?

A. The lower mast, supported by the deck, the topmast above that, and the top-gallant mast still higher.

Q. How are the masts supported on the decks?

A. By the standing rigging, which consists of strong ropes, or more recently of galvanized iron wire.

Q. What else is included under the term rigging?

A. The tacks and sheets, which serve to spread the sails, the stays, the yards, the traces, the haliards, and the shrouds.

Q. What are the shrouds?

A. Ranges of ropes extending from the hull to the head of the spars or beams. They support the masts, and being crossed by other ropes, form a ladder for the sailors to ascend and descend.

Q. What are stays?

A. Strong ropes used to support the masts in an opposite direction to the shrouds.

Q. What are the haliards?

A. Ropes or tackles by which any sail may be lowered. Sheets are also ropes used to extend the corners of sails.

Q. What are the yards?

A. Wooden bars crossing the masts, where they unite with each other, and forming a kind of platform for the seamen to stand upon when they climb the rigging.

Q. What are booms?

A. Also wooden bars to which the sails are connected, and round which they are hoisted or lowered by the haliards.

Q. What is the bowsprit?

A. A large spar extending beyond the bow of the ship. The jib-boom extends beyond that still further.

Q. What are the nautical terms fo different parts of a vessel?

A. The right side is called the star *board, the left* the larboard, or port, an *the middle* between these, amidships.

Q. What is meant by windward and eeward?

A. Windward is the point in the horizon from which the wind blows, and eeward the point towards which it blows.

Q. What is meant by a ship being in the offing?

A. That it is so far at sea, as to be out of anchor ground.

CHAPTER XIII.

ACOUSTICS.

Q. What is meant by Acoustics?

A. The science of sounds.

Q. What is sound?

A. Sound is supposed to be occasioned vibrations in the air caused by the ration of the body from which the nd proceeds.

. How are sounds conveyed to the

Mostly by air, but water, timber,

and flannel, are good conductors sounds. A bell rung under water h tone as distinct as that rung in the air

Q. How can we prove that tim conveys sound?

A. Stop one ear with the finger, press the other close to a long stick deal board, the ticking of a watch hel the other end will be distinctly heard.

Q. How can flannel be proved a c ductor of sound?

A. Tie a poker to a piece of flan three feet long, press the ends of flannel into your ears with the thu then swing the poker against an i fender, you will hear a sound like a v heavy church bell.

Q. How quickly does sound fly?

A. Sound travels at the rate of ab thirteen miles in a minute. This is case with all sounds; a whisper flie quickly as the loudest thunder.

Q. What is the principle upon wh a whispering-gallery is constructed?

A. Upon the principle of reflecti *Sound,* like light, after having b reflected from several places, may be collected into a point from whence it will be more distinctly heard than in any other.

Q. Why can sound be reflected in a whispering-gallery?

A. Because the gallery is circular, and therefore a whisper at one side, being reflected from all sides of the circle, is collected to the other side as a focus, and heard distinctly.

Q. Are not speaking trumpets made on the same principle?

A. Yes; the sounds being reflected from the sides, and prevented from spreading in every direction.

Q. What is an echo?

A. An echo is sound reflected from some surface, such as a wall, a house, or a hill, which throws it back again at intervals.

Q. How far off should the surface be to reflect back a syllable?

A. About eighty or ninety feet; for a dissyllable 170 feet.

CHAPTER XIV.

ARCHITECTURE.

Q. WHAT is the science of Architecture?

A. A science which enables us to build or decorate public edifices, and to erect our houses, &c.

Q. Is not architecture a very ancient science?

A. Yes: but it is not supposed to have reached any great magnificence till the time of Solomon.

Q. Whom did Solomon employ to build the temple?

A. The Tyrians, or people of Tyre, who afterwards taught their architecture to the Egyptians, from whom it passed to *the* Grecians, and from them to the *Romans*.

Q. Do all writers attribute the improvement of architecture to the Tyrians?

A. No; an ancient writer declares that Solomon received the rules of architecture from God; and that having employed the Tyrians as workmen in gold, silver, brass, &c. he taught it to them.

Q. Is it not commonly supposed that the science came from the Greeks?

A. Yes; for there is not an order or a moulding that has not a Greek name.

Q. But what proof have we of the magnificence of the Egyptian and Tyrian architecture?

A. The description given by Vitruvius of the Egyptian œci, pyramids, and obelisks, and from Isaiah xxiii. 8.

Q. From whom do we derive our knowledge of architecture?

A. From the Romans, whose buildings were magnificent, but who had no idea of beauty and order in them until they borrowed from the Greeks.

Q. How many orders or forms of architecture were known among the Greeks?

A. Five; the Tuscan, the Doric, the

Ionic, the Composite, and the Corinthian.

Q. Of what must each order consist?

A. Of a column and entablature. The column has three parts, the base, the shaft, and the capital; and the entablature three, the architrave, the frieze, and the cornice.

Q. Where are these different parts situated?

A. The cornice is the top, the frieze the flat part under it, and the architrave the part supported by the column or pillar.

Q. What are the parts of the column?

A. The base, the part which supports it, the shaft is the column itself, and the capital the ornaments at the top of the column under the entablature.

Q. In what consists the difference of these orders?

A. In the plainness or ornament of the entablature or capital; the Tuscan and Doric are the plainest, although the column of the latter is fluted; and the *Corinthian* is the most ornamental.

Q. What is said to be the origin of the Corinthian capital?

A. Vitruvius relates, that a Corinthian architect passed by the grave of a young lady, over which her nurse had placed a basket containing some of her playthings, and covered it up with a large tile to protect it from the weather.

Q. Upon what had the basket been placed?

A. Upon an acanthus root. As the branches sprung up they encircled the basket till they reached the tile, and then bent under it and grew downwards.

Q. In what way did the sculptor imitate this?

A. He imitated the basket in the body of his capital, the leaves in the volutes, and the tile in the abacus.

Q. What are the volutes of a column?

A. The volutes are the pointed ornaments round the capital, the abacus the top of the capital, or that part directly under the entablature. The Ionic order has four, and the Doric eight volutes.

Q. Is there any other order of architecture than the Grecian?

A. Yes, several; the ravages of the Visigoths in the fifth century destroyed the beautiful architecture of antiquity.

Q. What arose from this?

A. A new order called the Gothic, still much in use, and distinguished by its lightness and profuse ornament.

Q. How may it be known?

A. By its pointed arches, and by its pillars, carved so as to imitate several conjoined.

Q. Who introduced the Gothic order into England?

A. The Normans. The Saxons had also a simple style of building, semi-circular arches and plain massive pillars.

Q. What is the Attic order?

A. That which has a number of little pillars with an architrave cornice for an entablature.

Q. What is the Persian order?

A. It is that which has figures of Persian slaves instead of columns, to support *the entablature.*

Q. Is not the Caryatic order something similar to this?

A. Yes; the entablature is supported by figures of women. St. Pancras church in the New Road is built in this style.

Q. What is the meaning of it?

A. The Greeks having conquered the city of Caria, carried away the women captive; and to keep up a remembrance of their being slaves, represented them in their buildings supporting the entablature as a burden.

Q. Is not architecture a proof of civilization?

A. Yes; for in the early history of nations we find their houses built of mud or clay, and by degrees improving in form and materials.

Q. What are the common materials for houses?

A. Bricks, mortar, wood, and stone.

Q. Of what are the best bricks made?

A. Of clay, sand, and ashes; brick-making is now an extensive trade. They are made in moulds four inches broad, and eight or nine long.

Q. How are they hardened?

A. By burning in a kiln, or in clun of a number together with fire betw them; they are made in this way n London.

THE END.

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